STRATEGIC ENVIRONMENTAL ASSESSMENT OF DRAFT NATIONAL TRANSPORT POLICY OF PAKISTAN

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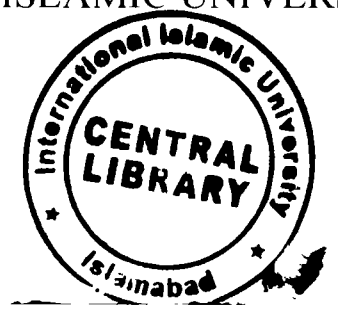

Strategic Environmental Assessment of Draft National Transport Policy of Pakistan

A thesis submitted to the Department of Environmental Science in partial fulfillment of requirement for the award of degree of Master Studies in Environmental Science of International Islamic University, Islamabad

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DECLARATION

I hereby declare that the work presented in this Thesis is my own effort, except where otherwise acknowledged and that the Thesis is my own composition. No part of this Thesis has been previously presented for any other degree.

Sajid Raza

Dated: _____

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IN THE NAME OF ALLAH, THE MOST MERCIFUL AND BENEFICIENT

DEDICATION

This research work is dedicated to my beloved parents

LIST OF ABBREVIATIONS

Acronyms	Abbreviation
ADB	Asian Development Bank
AEDB	Alternate Energy Development Board
APSHP	Andhra Pradesh State Highways Project
ATC	Air Traffic Control
BAP	Biodiversity Action Plan
CAA	Civil Aviation Authority
CBD	Convention on Biological Diversity
CCGT	Combined Cycle Gas Turbines
CITP	Chartered Institute of Transport Pakistan
CNG	Compressed Natural Gas
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EC	European Commission
ECTM	European Conference of Transport Ministers
EEA	European Environmental Agency
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EP	Energy Policy
EPA	Environmental Protection Agency
ETN	European Transport Network
EU	European Union
FEIS	Final Environmental Impact Statement
FTA	Federal Transit Administration
GDP	Gross Domestic Product
GHG	Green House Gasses
GNP	Gross National Product
GOP	Government of Pakistan
HCs	Hydrocarbons
HDIP	Hydrocarbon Development Institute of Pakistan
HST	High-Speed Train
ICAO	International Civil Aviation Organization
ICAO's	International Civil Aviation Organization's
IEM	Integrated Environmental Management
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
LNG	Liquefied Natural Gas
LTP	Local Transport Plan

MDG.....	Millennium Development Goals
Mmt.....	Million Metric Ton
MOC.....	Ministry of Climate Change
MTDF.....	Medium Term Development Framework
MWh.....	Mega Watt Hour
NATA.....	New Approach to Appraisal
NCS.....	National Conservation Strategy
NDMA.....	National Disaster Management Authority
NEMA.....	National Environmental Management Act
NEPA.....	National Environmental Policy Act
NEQS.....	National Environmental Quality Standards
NHA.....	National Highway Authority
NIAP.....	National Impact Assessment Program
NOx.....	Oxides of Nitrogen
NSDS.....	National Sustainable Development Strategy
NTP.....	National Transport Policy
NTRC.....	National Research Transport Center
NTS.....	National Transport Strategy
OECD.....	Organization for Economic Corporation and Development
OPDM.....	Office of Disaster Preparedness and Management
PBS.....	Pakistan Bureau of Statistics
PCAP.....	Pakistan Clean Air Program
PCP.....	Planning Commission Pakistan
PDMA.....	Provincial Disaster Management Authority
PCRET.....	Pakistan Council of Renewable Energy Technologies
PCRWR.....	Pakistan Council or Research in Water Resources
PEPA.....	Pakistan Environmental Protection Act
PES.....	Payment for Ecosystem Services
PIPS.....	Pakistan Institute for Population Studies
PM.....	Particulate Matter
PNSC.....	Pakistan National Shipping Company
PPPs.....	Policies, Plans and Programs
PR.....	Pakistan Railways
RMA.....	Resource Management Act
ROD.....	Record of Decision
ROI.....	Return On Investment
SEA.....	Strategic Environmental Assessment
SEHSR.....	Southeast High Speed Rail
SHIP.....	Strategic Highways Infrastructure Program
SLM.....	Sustainable Land Management

SMART.....	Self-Monitoring and Reporting tool
SPM.....	Suspended Particulate Matter
SUPARCO.....	Space and Upper Atmospheric Research Commission
TAG.....	Transport Analysis Guidance
TC.....	Transport Canada
TIR.....	Transports International Routers
TMA.....	Tehsil Municipal Authority
TOR.....	Terms of Reference
TSP.....	Total Suspended Particles
UN.....	United Nation
UNCLOS.....	United Nations Convention on the Law of the Sea
UNDP.....	United Nation Development Program
UNEP.....	United Nation Environment Program
UNFCCC.....	United Nation Framework Convention on Climate Change
US.....	United States
USG.....	United State Government
VOC.....	Volatile organic compounds
WCS.....	World conservation strategy
WHC.....	World Heritage Convention
WHO.....	World Health Organization

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ABSTRACT

The social and environmental impacts of transport sector are increasingly being seen as a menace to the sustainable development. In Pakistan, the overarching procedure of decision making considers the monetary and social viewpoints while overlooking the ecological needs at the policy, planning and execution levels and subsequently neglects to environment. This study aimed at providing technical support to policy makers in developing draft National Transport Policy (NTP) into a sustainable transportation policy integrated with National Sustainable Development Strategy. Therefore, this study was carried out by applying the tool of Strategic Environmental Assessment (SEA). The ultimate objective was to strategically assess the draft of the National Transport Policy and develop sustainability arguments for the integration of relevant environmental aspects into early stages of decision making process. As, the terminology and procedure to be used for SEA in Pakistan have not been established yet; therefore, the latest practice on environmental assessment/evaluation of transport sector from countries of Europe, North America, Asia Pacific, Australia and Africa was reviewed and an applicable approach was developed for SEA of draft NTP. That SEA process mainly contained the techniques like environmental screening, environmental diagnosis, setting SEA objectives, compatibility analysis of objectives of draft NTP and SEA objectives, assessing potential impacts of NTP implementation, proposing mitigation measures and monitoring plan for identified environmental impacts. For environmental diagnosis, established environmental governance framework in the country was analyzed which mainly emphasizes on some key environmental, social and economic aspects like; population and human health, air, water, soil, climate change, biodiversity, heritage sites, material assets, landscape and land use. These aspects were taken as "sustainability aspects" which sat the context for the collection of baseline information on a range of issues relevant to the NTP. Later, these issues provided indicators for setting of SEA objectives. The SEA objectives were then used as a standard yardstick to find out any distortions or inconsistencies and potential impacts of draft NTP. Therefore at first, compatibility between the main policy areas of draft NTP and the SEA objectives were evaluated. It was found that these objectives were generally compatible while, potential incompatibilities were also found where accessibility, infrastructure development, encouragement of transport services, trade and tourism were

envisaged. It was also observed that NTP do not emphasize on energy efficiency or the usage of natural gas and sources of renewable energy and therefore making the policy incompatible with many SEA objectives. The main issue identified clearly from the assessment was that the draft NTP generally has the potential for a positive impact on the environment, but the impact would be limited in scope and certainty because the policy objectives lacks clear targets to be achieved, dates for implementation and responsibility etc., which rendered the assessment highly uncertain. Many of the policy areas and measures are completely overlooking the relevant environmental aspects and have lack of commitments towards their solution. Also, there were some policy areas and measures that were administrative in nature and were not anticipated to have any adverse impacts on achieving of the SEA objectives. This has been discussed in detail under the topic of impact assessment for each of the draft NTP main objective and measure. In addition, mitigation measures for minimization of potential negative impacts as well as measures to enhance potential positive impacts have also been proposed. Most of the mitigation measures call for a quantifiable target and timescale for achievement. After adoption and implementation of such proposed potential recommendations the concerned departments should properly monitor the performance indicators and hence should replicate the process for further improvement.

INTRODUCTION

1.1. Background

The current practice of Environmental Impact Assessment (EIA) for projects is unable to respond to the complex and more vague nature of policy & planning level decisions. Such inability of the project's level EIA to make the complex nature of any decision-making process environment friendly, is the strongest reason for realizing the need for a new impact assessment tool, that is adaptable to more strategic and incremental levels of decision-making i.e. Strategic Environmental Assessment (SEA).

SEA is one of the various terms used for environmental assessment at the strategic level. The word 'strategic' in SEA has diverse meanings in the sequence of decisions, from broad policy visions to specific programs of more concrete activities. Each country, political or economic system will need to adopt the process and terminology most suitable to that context, in a way that is practical and responsive to integrative approaches towards sustainability goals (Therivel and Partidario, 1996). The complete process of SEA adopted for this study has been briefly described in the coming methodology chapter.

Practically for the first time, in 1970, US introduced a general environmental assessment (later became SEA) in public decision-making which was based on the US National Environmental Policy Act's (NEPA) requirement made in 1969 (USG, 1969). However, the President's Council on environmental quality defined these actions in 1978 to execute them to policies, plans, programs, regulations, procedures and legislative proposals. And hence, SEA was then introduced in the second half of the 1980s (Wright, 2006 and Wood, 2002). Later on the need for integration of environment in decision making (i.e. SEA) has also been agreed at international level through its various conventions and conferences including Brundtland Commission's Report in 1987, Rio Declaration of 1992, Millennium Development Goals of 2000, World Summit on Sustainable Development in 2002 and Rio Summit-II, 2012. In this regard, SEA has emerged as an important tool for integrating environment into strategic decision making process worldwide (Sheate *et al.*, 2004; Sadler and Verheem, 1996; Partdario, 1997).

In keeping with that general trend, SEA in the transport sector has been emerging in this context. In 1998, an initial volume on the topic of "SEA and the transport sector"

was published by the European Conference of Transport Ministers (ECTM). In 1999, the OECD and the ECTM organized a joint conference on SEA, which produced a publication on "SEA for Transport" (ECTM, 1998; 2000). In that time the European Environment Agency also published the results of the "Spatial and Ecological Assessment of the European Transport Network (ETN)" (EEA, 1998), showing the contribution of SEA in a strategic European effort such as ETN. In 2000, the European Commission produced a publication on the "application of SEA specifically in the transport sector" (EC, 2000), and in 2001 it published another report on the use of SEA in transport corridors (EC, 2001). Further, in 2001 in Finland, a major workshop was held on the title of "Transport Planning: Does the influence of SEA/Integrated Assessment Reach Decision Making?" (Furman, Hildén, 2001). Then in 2002, the first volume on the topic of "SEA and transport planning and land use" was published (Fischer, 2002).

This evolution of SEA in the transport sector has also been promoted by an expansion of practical applications (Dalal-Clayton and Sadler, 2005), and the publication of various specific guides on the application of SEA in the transport sector (EC, 2005; Department of Transport, 2004). Since then, SEA in the transport sector has been using extensively, not only in Europe, but also among OECD countries and to some extent in Asia too (World Bank, 2006).

In Pakistan, for the first time the term SEA was reflected in section 5.1(d) of National Environmental Policy of 2005 and then National Impact Assessment Program (NIAP) of Planning Commission of Pakistan included SEA. Soon after, National Climate Change Policy, 2012 and National Sustainable Development Strategy, 2012 also declared that SEA to be encouraged as an effective system to integrate the environmental costs and effects in the planning system and decision making process in Pakistan. However, there is no legislative mandate for SEA in Pakistan and the term is not found in any of the legislations in Pakistan. Moreover, practical experience and familiarity with SEA amongst planners and policy-makers as well as researchers is still extremely limited.

1.2. Introduction to SEA

Different authors describe this phenomenon in different complex ways. Nevertheless, SEA in many ways is similar to environmental assessment of projects;

and it is simply the application of project level EIA's principles to broad level decision making process such as to policies, plans, and programs. But, Project's EIA usually takes place at a stage when it is too late to consider the effects of PPPs' (Policy, Plan and Programms) decisions while SEA deals with earlier stages of PPPs tiering process, and it now became an umbrella like term that describes several and sometimes different processes of analysing PPPs than project's EIA. However, all the new interpretations are somewhat connected with each other, either through different geographical and time scales of SEA and EIA (Lee and Walsh, 1992); different levels of detail at strategic and project tiers (Partidario and Fischer, 2004) or at different manners in which strategic decisions are organized, when compared with project making process (Nitz and Brown, 2001; Kornov and Thissen, 2000). Generally, there are two reasons for which SEA is required, either to counteracts some of the limitations of project EIA or to promote sustainable development (Therivel and Partidario, 1996).

In simple words, "SEA is the Environmental Assessment (EA) of a strategic action: a policy, plan or program (PPP)" (Therivel *et al.,* 1992). According to European SEA Directive, "SEA is an important tool for integrating environmental considerations into the preparation and adoption of certain PPPs, which are likely to have significant environmental effects, because it ensures that such effects of implementing PPPs are taken into account during their preparation and before their adoption". In general understanding, SEA is a planning tool that can inform a decision maker about the full range of likely strategic impacts of PPPs.

1.3. Applications of SEA

Actions requiring SEA are those, whose subsequent application is likely to give rise to significant environmental impacts to the extent that these cannot be assessed and mitigated satisfactorily at any other stage in the planning process. According to OECD (2005), application of SEA is based on the availability of data, level of definition of PPPs, knowledge of direct and indirect impacts and available timeframe for the SEA. Its application is also based on the political or economic system of each country and hence they will need to adopt the process and methodology most suitable to that context, in a way that is practical and responsive to integrative approaches towards sustainability goals (Therivel and Partidario, 1996).

The range of application for SEA is and has been applied at different situations, such as international and national treaties, trade agreements, economic development plans, funding programs, spatial land use and energy, waste, water and transportation related PPPs. Therivel and Partidario (1996) states that in general, SEA can be applied to three main types of actions:

i. Sectoral PPPs, which are related to specific sectors (*e.g.* transport, mineral extraction, energy, tourism);

ii. Area-based or comprehensive PPPs, which cover all activities in a given area (e.g. land-use or development plans); and

iii. Actions that do not give rise to projects but nevertheless have a significant environmental impact (e.g. agricultural practices, new technologies, privatization)

Application of SEA at policy level has remained scarce. Although USA, Canada, Australia, New Zealand and many of the countries in Europe like Finland, Denmark, Norway, Netherlands and France etc. implemented procedures for incorporating environmental considerations into policies and SEA is a statuary requirement for policies there, but the practical application is rarely found as discussed in chapter 2. Therefore, there is a need for SEA to recognize link with policy level decisions and, where feasible, reinforce other policy level assessment approaches used to shape development of policies. This will help ensure environmental considerations are not overlooked and that SEA helps in underwriting the sustainability of policies outcomes.

1.4. SEA and transportation sector of Pakistan

Transportation plays an important role in daily human life which provides access to facilities and services like education, employment, health services and leisure etc. that are central to the lives of every citizen. An inadequate transport system and lack of accessibility to daily catering needs can leave the citizens in exclusion. Therefore, planning the transportation system and making a sustainable policy for it, is an essential process. According to Spaethling (1996), sustainable transportation policy is the "policy that serves multiple goals of economic development, environment stewardship and social equity, has the objective to optimize the use of transportation systems to

achieve economic and related social and environmental goals, without sacrificing the ability of future generations to achieve the same goals".

In Pakistan, since 1998, the Chartered Institute of Transport Pakistan (CITP), National Research Transport Centre (NTRC) and the Planning Commission of Pakistan (PCP) drafted three national transport policies but none of them were approved. And therefore, the country has been failed to make a general transportation policy or any urban transport policy. Qureshi and Huapu (2007) analysed these policies against some standard indicators of sustainable transportation and illustrated the significance of these indicators as shown in table below.

Table 1.1: Analyses of National Transport Policies of Pakistan.

	CITP	PCP	NTRC
Environment			
Resource utilization	*	×	*
Waste utilization	×	×	×
Emission reduction measures	**	*	***
Noise reduction	×	×	*
Depletion of non-renewable energy	×	×	×
Promotion clean fuel technology	×	×	×
Promoting research & development	×	*	***
Economic			
Accessibility	*	**	***
Economic instrument	×	×	***
Economic productivity/ efficiency	**	**	**
Proportionate investment on transport infrastructure	*	×	**
Social			
Affordability	**	×	***
Safety & security	***	**	***
Equity	×	*	****
Health impacts	**	*	**
Planning			
Integrated transport and land use planning	****	×	×
Promoting non0motorized transport	×	×	***
Promoting public transport	****	**	**
Personal vehicle reduction strategy	×	×	×
Public participation	×	×	***
Institutional development	**	**	**

* illustrates the intensity of emphasis ranging from * to ****
Source: Qureshi, and Huapu, 2007.

Currently, an adequate government and technological support for sustainable development of transportation policies and plans is needed because, the negative

impacts of unsustainable transportation system have increasingly harmed our environmental circumstances and are continuing to worsen the quality of life. The aging and ill maintained vehicle fleet combined with its unchecking has ruined the road condition which has resulted in severe congestion on the roads and serious levels of noise and air pollution. In such situation, SEA is a tool used to verify whether these PPPs comply with the principles of sustainable development and, in particular, to ascertain the intensity of the impact of these PPPs on the environment. The ultimate objective of SEA is to incorporate arguments about the environmental context into the very earliest stages of any decision making process.

1.5. Problem statement

In Pakistan, the overarching procedure of decision making considers the monetary and social viewpoints while overlooking the ecological needs at the policy, planning and execution levels and subsequently neglects to meet the prerequisite of sustainable development. This is the common practice in all state and private departments including transportation. Divided work techniques combined with absence of coordination between the departments are real difficulties for accomplishing sustainable development. Significant contortions originate from differential points of view of partners and conflicting interests, which give obstruction in accomplishing a level of exchange off in policy making. While, for a sustainable PPP it must be incorporated with other related government PPPs and objectives.

Also, to evaluate the effects identified with transportation framework and exercises, Environmental Impact Assessment (EIA) is regularly conducted for such projects. Nevertheless, there are inquiries regarding the capacity of EIA to deal satisfactorily with the difficulties now connected with these projects. EIA is outfitted to the environmental improvement of individual projects, while the issues we now confront should be tended at a more advanced stage, at a provincial, national or even super-national scale, and environmental protection should be incorporated with general system of these PPPs at a much prior phase of origination. The need to examine environmental concerns of higher decision making level is been pointed, particularly in light of questions about EIA capacity to manage such difficulties. Thus, it is important that such strategies and plans must undergo through Strategic Environmental Assessment before their execution.

1.6. Aim and objectives of the study

The aim of the study was to provide technical support to policy makers to develop the draft National Transport Policy (NTP) into a sustainable transportation policy.

Whereas, the objectives of the study were:

1. to assess the potential of SEA as a tool for sustainability assessment of draft National Transport Policy;
2. to identify distortions and inconsistencies in draft National Transport Policy;
3. to suggest measures to remove identified distortions and inconsistencies in the draft National Transport Policy and develop coherence and synergy with the established environmental governance framework of the country; and
4. to envisage and assess the environmental impacts of National Transport Policy implementation and propose measures to mitigate these impacts.

1.7. Significance of the study

After achieving the above objectives, it is expected that importance of SEA as a tool for sustainability assessment of policies will be realized. It will provide a tool to support informed policy and decision making and will be a contribution to National Sustainable Development Strategy of Pakistan. Also it will help in early assessment of adverse environmental impacts rather spending more on abating negative impact after implementation. Possible practical implications and alternatives will be identified and will help in integrating environment and sustainable development in all sectors. According to identified problems, appropriate recommendations will be provided. This study may also provide management options for government for developing likely future scenario on the basis of current facts and figures predicted. A baseline for further research will be built and it is hoped that this study will stimulate the studies of similar nature in Pakistan.

LITRATUERE REVIEW

In this chapter, the latest international practice on environmental evaluation and SEA for transport related PPPs (policies, plans and programs) and other actions have been reviewed. The evaluation tools used and whole SEA process adopted as well as legislation status for these practices have been reviewed. Transport related SEA practices were reviewed in main countries of Europe, North America, Asia Pacific, Australia, Africa and some developmental Co-operations. While sometimes the word "SEA" is not used in some countries, environmental assessment is still required for transport related PPPs in these countries which serve similar purpose to SEA. Therefore, either the environmental evaluation or SEA for transport related PPPs were reviewed in this chapter. Possible examples of the environmental evaluation/SEA for main transport modes such as road, railway and air transportation have also been extracted and illustrated to show the process and tools used in environmental assessment and its application and outcomes in the relevant country.

2.1. SEA' practice in Europe

In England, the Environmental Assessment of Plans and Programmes Regulations, 2004 implements the requirements of EU Directive 2004/42/EU, known as 'the SEA Directive'. The European Directive 2001/42/EC 'on the assessment of the effects of certain plans and programmes on the environment' came into force in July 2004. Although it does not use the term 'Strategic Environmental Assessment', it has become known as the SEA Directive. The objective of the Directive is "to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development". Now, it is observed that the EU Directive 2001/42/EC (or SEA Directive) has been transposed to legislation by most of the countries in Europe, e.g. UK and Finland.

Before the transposition of SEA Directive into legislation in UK, an assessment approach was introduced (named as 'New Approach to Appraisal (NATA)'), to guide the assessment process of transport related proposals. NATA was adopted in 1997 as the methodology for improving the consistency and transparency of making transport decisions. It provides a consistent framework for the assessment of key economic, environmental and social factors which affect transport related decisions.

In 2005, the UK government has been trying to integrate the concept of SEA into the existing NATA system. For that purpose, a unit under "Transport Analysis Guidance (TAG)" was published which was named as "SEA for Transport Plans and Programs. The purpose of

this unit was to guide 'how to carry out SEA for transport plans and programs in England'. According to this document the process of SEA for transport related PPPs has been divided into five main stages as below.

A. Setting the context, identifying objectives and problems and establishing the baseline

B. Deciding the scope of SEA and developing alternatives

C. Assessing the effects of the plan

D. Consultation on the draft plan and the Environmental Report

E. Monitor the significant effects of implementing the plan on the environment

Stage A contains Scoping Report while stages B to E will cover the Environmental Report, which will build on the content of the Scoping Report. The public and Environmental Bodies will be given the opportunity to comment on the draft NTP and Environmental Report. Following consultation and revision, the Council will be asked to adopt this SEA report. According to the unit the most important aspects of environment to be considered in transport related decisions are Air, Climatic factors, Biodiversity (fauna and flora), Soil, Water, Landscape and Cultural heritage including architectural and archaeological heritage.

SEA of "Torbay Local Transport Plan (LTP), 2006–2011" is a good example in England. The Torbay LTP is a long-term strategy that aims to improve air quality, congestion, quality of life, road safety and accessibility in Torbay. The main issues from implementing such plan were anticipated such as; improving accessibility to protected areas for visitors may affect the area and species and can affect brownfield sites also; agricultural land may be affected due to location of certain schemes mentioned in LTP; there may be some noise impacts from increased numbers of buses (detail is in Appendix 6). To overcome such issues, two alternatives, the "LTP Strategy "and the "Do Nothing" option were valuated against the objectives made for the conservation/protection of the environmental aspects mentioned in above Para. These objectives were called SEA objectives.

After analysis, the LTP Strategy was preferred with the proposition of several schemes and alternatives such as; supporting the plan further by other public transport scheme; incorporation of sustainable urban drainage and noise reduction in resurfacing schemes (particularly in flood prone areas); reducing traffic burden in flood prone areas in the longer term and rail bus integration etc. LTP strategy with these alternative schemes was preferred because it could reduce air pollution and GHG emissions levels due to reduced congestion

and reduced car use. Also due to reduced traffic it could improve streetscape in conservation areas and could reduce noise impacts on busiest corridors. Other examples of such reports may include "SEA of Local Transport Plan (LTP) For Greater Nottingham 2006/07-2010/11, (2006)".

Almost same experience was observed in the country of Northern Ireland. They followed the same process and highlight the same environmental topics as practiced in England. Successful practices of such SEAs conducted are "Environmental Report of Draft Sub-Regional Transport Plan, (2015)" and "Regional Land Transport Strategy and Regional Passenger Transport Plan for Taranaki, (2006)".

Also in Wales, although all the requirements and process are same to England but instead of considering the fixed environmental areas like considered in England and Ireland, their consideration of assessment in transport sector are improving all modes of public transport; developing interchange facilities; enhancing distribution of freight; improving safety, health and environmental conditions on all roads and reducing road traffic. Good examples of such SEAs accomplished are the "SEA of National Transport Plan for Wales, 2010", "SEA for Neath Port Talbot County Borough Unitary Development Plan" and "Draft Wales Rural Development Plan (RDP), 2007-2013".

In Scotland, SEA has first been applied as a statutory instrument in Environmental Assessment of Plans and Programmes (Scotland) Regulations 2004, which implements the EU Directive 2001/42/EC (SEA Directive) of 2004. In order to fully integrate SEA in Scottish legislations; this regulation was replaced in 2006 by the Environmental Assessment (Scotland) Act of 2005. Now, according to this act all the strategies, plans and programms are subjected to environmental assessment if it is related solely to the whole or any part of Scotland. While conducting SEA, the environmental areas to be considered are same as that of England and Ireland however the SEA process contains only four parts as screening, scoping, environmental report and monitoring. The best examples of SEA in Scotland can be "SEA on Aberdeenshire Council's Local Transport Strategy (LTS, 2006 – 2009)" and "SEA on Scotland's National Transport Strategy (NTS)".

In Finland, SEA is applying to policies, plans and programs as a statuary instrument through the "Act on the Assessment of the Impacts of the Authorities' Plans, Programmes and Policies on the Environment, (2005)". This new legislation is recruited in accordance with the EU/SEA Directive. Main process of the assessment contains planning the assessment process

and devising alternatives; planning the stakeholders' participation and cooperation process; impact evaluation; alternatives comparison and monitoring. While areas to be considered for assessment include protection of buildings, landscapes or townscapes; increase or decrease in the need of transportation and mobility; interlinking different transport modes; public transport and non-vehicular traffic congestion and emissions level from transportation. The best examples of SEA practice found were "Rail network 2020" and "Environmental Guidelines for the Transport Sector until 2010".

In Denmark, SEA is required by "Prime Minister's office circulars" for policies and all government bills and proposals submitted to parliamentary approvals, if they are expected to have significant effects on the environment. While for plans and programs EU/SEA Directive was transposed by the "Act on the Environmental Assessment of Plans and Programmes" in May 2005. The process of assessment contains screening, scoping of major effects, assessment and analysis of effects and publication of a non-technical report which will contain the description of environmental effects. In transport sector the key aspects to be considered for assessment are traffic congestion and transport tasks; transport modes distribution; car transport alternatives; relevant environmental issues and traffic plan up-gradation and research. A good experience of such SEA is "The Danish Government's Action Plan for Reduction of the CO_2 Emissions of the Transport Sector (1996)".

In France, under Ordinance No 2004-489, Strategic Impact Assessment (SIA) is a statuary instrument using for policies while SEA is using for plans and programs. EU/SEA Directive for plans and programmes was transposed to legislation in June 2004. The overall process of assessment include diagnosing the environment (situation analysis of relevant environment aspects and assessing relevant environmental objectives of government and other PPPs); Compatibility assessment (between the strategic action's objectives and SEA objectives); Assessment of the potential impacts of the whole plan and proposing mitigation measures. Example may include Northern corridor (1998) (a broad expanse of land between Le Havre, the north of the Greater Paris region, Nancy and the Brussels region, for a study co-financed with the European Commission).

In Germany, SEA is using as a statutory instrument for federal level while administrative for Lander level plans and programs under EIA Act (UVPG) (2005). SEA regulations will be constructed by 16 Lander under this EIA Act. The 16 Lander also has to implement SEA through own laws. The overall process of the assessment contains Screening, Scoping, Preparing the environmental report, Consultations, Revision of the environmental report,

Decision making, Information of the authorities and the public involved and monitoring. For transport related PPs, main assessment considerations include sustainable mobility, safety, sustainable development, competitive employment opportunities development, fair and comparable conditions of competition for all modes of transport, level of noise, pollutants and climate change gases reduction. Good example of SEA is German Federal Transport Infrastructure Plan 2003.

Likewise in Germany, Same practice for SEA was observed in Austria. Here, the EU/SEA Directive has been transposed for both Federal level and Lander level. However, for transport sector, it is transposed to Federal level at the moment. SEA of the Danube corridor is an example of such experience.

2.2. SEA related practice in North America

In USA, among the three assessment processes, namely Environmental Assessment (EA), Environmental Impact Statement (EIS) and Categorical Exclusions (CE); EIS is thought to be an SEA-like process which is a statuary requirement for policies, plans and programs by National Environmental Policy Act (NEPA). According to EIS, in transport sector the main aspects to be considered are assessing the purpose and need of the proposed strategic action, alternatives assessment (including the proposed strategic action); the relevant environmental aspects and their relevant consequences. While the overall process of assessment include below basic steps

1) Preparation of Draft EIS (DEIS) which will be reviewed by government agencies and public.
2) After review, preparation of a Final EIS (FEIS) accordingly.
3) After submission of FEIS, Federal Transit Administration (FTA) will issue a Record of Decision (ROD) (a concise report that will state FTA's determination that NEPA on the proposed action, as described in the FEIS, has been completed).
4) Once ROD is provided, the relevant agency may proceed having complied with NEPA.

For instance, EIS of "California High-Speed Train Final Program EIR (2005)" was prepared by the California High Speed Rail Authority. This program proposes a high-speed train (HST) system to provide a reliable mode of travel. It links the major metropolitan areas of the state and delivers predictable and consistent travel times. It also makes an interface with highway network, commercial airports and mass transit to relieve capacity constraints of

existing transportation system. The main environmental issues that could raise from such a program were emissions of PM_{10}, indirect energy consumption by constructing HST, increase in noise due to additional high-speed train frequencies and other potentially significant unavoidable environmental impacts on resources, including noise, biology, wetlands, and farmlands.

To overcome such issues they analysed the alternative of proposed HST and compared it with a No Project/No Action Alternative and a Modal Alternative (contain potential improvements to the highways and airports serving the same intercity travel demand as the HST Alternative). The HST alternative considered potential HST technologies, corridors, and alignment and station options within the corridors. During analyzing and comparing the HST alternative the main considered factors were Travel time, Reliability, Safety, Connectivity, Sustainable capacity and Passenger cost.

After comparison and analysis they chose the alternative of HST (which operates speeds over 200mph or 322kph) because all the considered factors and environmental criteria were fulfilled by HST. However certain measures were included in HST such as; noise barrier mitigation because it is shown to be effective for receivers close to the tracks. 2nd measure was implementation of using tighter diesel truck standards, which was expected to produce an overall reduction of 98% from uncontrolled engine emissions. And measure 3rd was to avoid or minimize footprint in floodplains. The HST alternative with such measures although still have potential significant environmental impacts on resources, including noise, biology, wetlands, and farmlands, but it had benefit in energy savings, reduced air emissions, and less noise, vibration and other adverse impacts during construction. EIS for Southeast High Speed Rail (SEHSR) project is also a good example of such SEA like experience in USA.

In Canada, Under Cabinet Directive 1999, Transport Canada (TC) is required to undertake a non-legislated SEA-like environmental assessment process for proposals being submitted for all federal policy, plan and programme initiatives submitted to the Minister or to Cabinet for consideration and approval. In order to apply and balance these diverse principles effectively and consistently in the development of transportation proposals, TC in 2001 prepared their own policy statements on SEA. According to this statement the process of SEA in Canada will contain

- Preliminary scan (developing a proposal for approval to determine whether important environmental effects are likely).
- Detailed analysis (a more detailed analysis will be required if there were important

environmental effects or some risk associated with the outcome)

- Public consultation (consultation undertaken specifically for the SEA to identify environmental concerns).
- TC will make the Proposal and submit it to the Minister or Cabinet for decision making.

During this assessment process the main areas to be considered in transport related PPPs are use of transportation modes, use of public transport/private vehicles, human safety and health, pollution control and energy consumption of transport, environmental technologies and their application, transportation technology and alternative, pricing of transportation services and economic de-regulation. A good example of such SEA in Canada is the Strategic Highways Infrastructure Program (SHIP).

2.3. SEA related practice in Asia Pacific

In Mainland China, Environmental Impact Assessment (EIA) is a statutory requirement for plans and programs (PPs) under the National EIA Law, 2003. For policies, environmental assessment has been excluded from the context of the EIA Law and so, there is little experience on assessment of policies in Mainland China. The assessment process for transport plans and programs include the identification of environmental parameters and objectives for transport planning, proposing mitigation measures and recent tasks. They propose and implement mitigation measures in the existing PPs rather than suggesting alternatives. During the process they main concerns are landuse, city planning, Transport architecture, Information and efficiency, Environmental aspects and Public satisfaction.

For example, an EIA of "The integrated transport plan of Shenzhen City (2006-2030)" was done by Shenzhen Municipal Bureau of Land Resources and Housing Management, Shenzhen Municipal Bureau of Communications and Shenzhen Municipal Bureau of Transport Police. The administrative body for the plan approval was Shenzhen Urban Transport Planning Centre (Agency of the EIA report preparation). The main objectives of the plan included co-operation of the transport system with urban development; land utilization and environmental protection; integration of different kinds of methods in internal transport system; development of urban transport system; to bring out the strategic plan for the development of Shenzhen urban transport and preparation of the solution for the whole transport system.

Before the implementation of such plan the main environmental issues were identified such as; New car driving can lead to low standard of environmental protection; Lack of

environmental protection classification for vehicles and relevant regulations; Lack of strict implementation of the "Regulation of Vehicle Annual Examination and Enforced Scrap"; Lack of strong supervision for the vehicle exhausting emission and New method of noise reduction was not applied. Therefore during EIA the main concerns for evaluation were Traffic capacity, the average speed of vehicles, Road safety and Transport environmental protection. In order to overcome such issues, the following mitigation measures were proposed to include in the existing plan;

- Improving vehicle's standard to European III
- Making standards for noise pollution reduction, and for annual vehicle examination.
- Developing new technologies to reduce vehicle's noise pollution level.
- Providing customized line for heavy vehicles
- Strengthening of education and awareness
- Improving gasoline quality
- Promoting consumption of cleaner energy sources for public transport
- Promoting the use of electric, hybrid electric and natural gas vehicles for public transport

In Pakistan, for the first time the term SEA was reflected in section 5.1(d) of National Environmental Policy of 2005 and National Impact Assessment Program (NIAP). Soon after, National Climate Change Policy, 2012 and National Sustainable Development Strategy, 2012 also declared that SEA to be encouraged as effective system to internalize the environmental costs in mainstreaming decision making process and the planning system in Pakistan. However still, SEA is not a statuary requirement in Pakistan and the term is not found in any of the legislation in Pakistan. Moreover, practical experience and familiarity with SEA amongst planners and policy-makers as well as researchers is still extremely limited.

There is no formal requirement or national system established for SEA of policies, plans or programs in the countries of Macau SAR, Japan and Singapore. However in Thailand SEA has just recently been introduced through four preliminary approaches, they are:

1. SEA – EIA School
2. SEA – Area Base
3. SEA Policy Options
4. SEA – Development Direction

2.4. SEA in Australia and New Zealand

In Australia, Under Environmental Protection and Biodiversity Conservation Act (EPBC, 1999), the SEA-like framework contains five types of assessment approach for PPPs, including:

1. An accredited assessment process
2. A public environment report (PER)
3. An environmental impact statement (EIS)
4. An assessment on preliminary documentation
5. A public inquiry

Out of these five approaches, the Minister must choose one for assessing the relevant impacts of an action. The general process for these assessment approaches contains Screening, Scoping, Preparing the Environmental Assessment (EA) Report and EA Review and Project Appraisal. In transport related PPPs, the main environmental aspects to be consider are air pollution (particulates and greenhouse gases), noise pollution, visual impacts, barrier effects, heritage assets and indigenous and colonial values.

An EIS of Second Sydney Airport Proposal at Badgerys Creek (1997) was prepared by the Department of Transport and Regional Services (DOTARS), Environment and Infrastructure Pty Ltd and a consortium led by Airport Planning Pty Ltd. Basically it was a proposal to take the decision for building a domestic and international airport at Badgerys Creek in western Sydney. For this purpose below three options were assessed under EIS process.

- Option A: Developing airport with two parallel runways on north-east to south-west alignment within the Commonwealth land;
- Option B: Developing same runways as option A with a cross wind runway and greater distance between them on an expanded land area;
- Option C: The land area using in option B will be expanded of the already owned Commonwealth land.

The main environmental issues that could arise from these three options were noise, air pollution and effects on biodiversity. These impacts were compared for all options and it was found that option C is likely to cause more noise pollution than Options A and B. On the other hand due to the smaller site area of Option A; more people are likely to be impacted from air pollution than for Options B and C. while in case of flora and fauna, option A showed the least impact. Therefore no options were selected and the review of potential alternative sites confirmed that Badgerys Creek remains the most feasible site for a second major airport because it would result in a range of lower impacts compared to the potential

further development of Sydney Airport. Other relevant example of such EIS in Australia is "the Christmas Island Airport Upgrade (2001)".

The enactment of the Resource Management Act (RMA) implemented environmental assessment in New Zealand in 1991 which is now using as an SEA-like instrument for policies, plans and programs. The process of SEA is dependent on the type of PPP; each proposal to be assessed will have its own process for SEA. However the main elements of SEA are constant for each type of PPP assessment.

For instance, McGimpsey & Morgan, (2013) developed a conceptual model for Regional transport planning in New Zealand where SEA elements were modified into the existing framework to promote the consideration of environmental and sustainability issues. The research highlighted some ongoing issues around the integration of SEA in existing frameworks and around the scope of SEA as a decision-aiding tool. The approach recommended in this study was to work within the existing framework to expand on existing SEA elements as necessary. However the main recommended aspects to be considered in transport related proposals are access and mobility, safety and security, public health, economic growth and environmental sustainability of transport in the nation. The best example of transport related SEA in New Zealand are "Regional Land Transport Strategy and Regional Passenger Transport Plan for Taranaki (2006)" and "National Rail Strategy to 2015".

2.5. SEA in Africa and some Development Co-operations

In South Africa, although SEA is not a statuary requirement but still it is used on administrative level. The National Environmental Management Act (NEMA) instructs some Integrated Environmental Management (IEM) tools, in which SEA is used as an environmental assessment approach for policy and planning process. The SEA process completes in several steps like identifying broad plan or program alternatives, screening, scoping, situation assessment, formulating sustainability parameters for the development of the plan or program, developing and assessing the alternative plans and programs, decision-making, developing a plan for monitoring and auditing and implementation. Transport related SEA application could not find.

The World Bank made compulsory Sectoral/Regional Environmental Assessment for policies, plans and programs under "Operational Policy/Bank Procedure (OP/BP) 4.01". PPPs are categorized on the basis of the significance of the expected environmental impacts. These categories are named as Category A, B, C and FI. PPPs in Category A and B must undergo environmental assessment in which Category A will be analyzed in more depth. In general,

the environmental assessment process contains screening, Scoping and Development of Terms of Reference (TOR), preparing the environmental assessment report and review of EA and project appraisal. In transport related PPPs, the two main aspects to be considered are natural environment (air, water, and land) and Global environment (climate change, O_3 depleting substances, adverse impacts on biodiversity and pollution of international waters).

A Sectoral Environmental Assessment was accomplished for "Andhra Pradesh State Highways Project (APSHP), India (1997)" under World Bank's Operational Directive, 1989, Environmental Protection Act, 1986, Water Act, 1974, Air Act, 1981, Public Liability Insurance Act, 1991 and Forest Act, 1980. The objective of the APSHP project was to reduce the total cost of road transport by improving road conditions and capacity, along with R&Bs in-house capabilities to design, manage and operate the road network.

The project was assessed against physical and natural environmental factors (included water, air quality, noise, flora and fauna, topography/soil and landform) and human and social environmental factors which included Road safety; Occupational Health and Safety; Cultural Heritage; Community life and economic activity; Land Acquisition and Resettlement; Indigenous and Traditional populations; Aesthetics and Landscape; Urban Centre s and Built-Up Areas and Non-Motorized Transport.

It was found that soil erosion due to construction activities can cause some visual and physical obstruction. Excavations can also cause drainage and visual problems, with the potential for increased disease vector activity. Resumption of land can result in some minor landuse change in the short term. Dust, lead, zinc and hydrocarbons deposited on the road surface can drain into the water system in the long term. Due to high road traffic in urban areas and industrial areas, noise can be one of many audible disturbances. Roads space usage can affect areas of critical natural habitat which is house for important flora and fauna species. Consequently, these problems can lead to depletion of resources (crushed rock and sand) in longer term. In order to control and mitigate such problems following measures were proposed.

- Restoration of borrow pits through topsoil replacement and re-vegetation to ensure drainage and visual uniformity.
- Immediate roadside vegetation after earthworks.
- Dust and noise control through site watering.
- Siltation (pollution of natural watercourses) control through setting combustion camps and offices.
- Wildlife protection through development of compensatory habitat to wean wildlife away

from the road.

Another good example from the World Bank can be "Environmental Audit of Kurla–Thane 5th and 6th Railway Line Project (2002)".

The Asian Development Bank (ADB) also made SEA compulsory for PPPs under their Environmental Policy, and using SEA as a tool for environmental assessment of program loans and sector loans. The main steps in the SEA process of ADB are Screening, Scoping, Identification, Prediction and evaluation of effects, Integration, Mitigation, Monitoring, Independent review and Influence on decisions. Environmental concerns in transport related PPPs include Water pollution (coastal, marine, and freshwater aquatic resources); Solid waste (municipal and industrial); Land degradation; Deforestation; Biodiversity loss; Urban Air Pollution (suspended particulates, lead and SO_2 emissions from vehicles) and Climate change (GHG emissions due to fossil fuel use in transportation). SEA of "Sub-regional Transport Connectivity Project in India" is a good example of such practice by ADB.

According to "Environment and Safeguards Compliance Policy" of the Inter-American Development Bank, "the bank will provide loans and technical assistance for environmental and natural resources management activities across different sectors, beyond required environmental mitigation actions to increase long-term sustainability. It will also seek to enhance appropriate public and private operations across sectors, such as urban development, transportation and road infrastructure, and agriculture". The process of SEA described by the bank is to understand the nature of the proposal; to set a context for SEA; to define a participation process; scoping of major issues and alternatives; to assess environmental and social outcomes and benefits and to establish a scheme for further action. "SEA of the Northern Corridor of Bolivia from La Paz to Guayaramerín" is a transport related example of such practice by Inter-American development bank.

United Nation Development Program (UNDP) still did not make SEA as a compulsory requirement. However they assist their partners in applying SEA to improve their quality of life and can reduce poverty. Partner countries can apply SEA to their PPPs with UNDP assistance. United Nation Environment Program (UNEP) also recently applied SEA to policies, plans and programs in partner countries. Assistance is provided for SEA application to PPPs in partner countries by UNEP. However it was difficult to find any SEA practice for transport related PPPs under both the program's assistance.

Throughout the review, it was found that most of the European countries have been transposed the SEA Directive into their own legislations. These countries have also published a general or specific transport related SEA guidance notes to instruct the responsible

authority. Besides, the countries like USA and Canada have regulated a clear and explicit system of environmental evaluation with detailed guidelines for the transport sector. However in Asia Pacific, many countries have established some SEA-like assessment procedure while some countries are still in formative stage administratively e.g. Pakistan. The purpose of this review was to find out and develop an applicable SEA approach in the transportation sector of Pakistan which described in the next chapter as methodology.

APPROACHES AND METHODS

The literature reviewed (chapter 2) revealed that different countries and administrative bodies are using different terminologies and processes for the environmental evaluation/assessment of broad level PPPs, and SEA is not a fixed term used. However, it is agreed upon here that the term SEA is being used in Pakistan for the environmental assessment of broad level PPPs at administrative level because this word has been reflected in the National Environmental Policy of Pakistan, 2005 and other administrative documents like Provincial Environmental Acts, National Impact Assessment Program and National Sustainable Development Strategy. However, still the general process for SEA and terminology to be used in it is not documented yet and there is no fixed process or guidance document published for the assessment of transport sector. Therefore from the review of many SEA practices in different countries and development co-operations, the following is the best adopted methodology for the environmental assessment of draft National Transport Policy of Pakistan, 2009.

3.1. Environmental Screening

The process of deciding whether a Policy will require SEA or not, is called screening. Policy, whose huge natural impacts can be resolved through screening or pre-screening process, should not carry further process. Screening of the draft NTP was carried out by following the standard procedure and rules of EU/SEA directive and Pakistan Environmental Protection Agency (EPA) requirements.

3.2. Environmental Diagnosis

The purpose of this step is to set an outline for SEA through situational analysis of current environmental scenario and relevant requirements of other policies plans and programs (PPPs) etc. Therefore this step further includes analysis of all relevant objectives of government and environment in other PPPs, and description of relevant environmental profile.

3.2.1. Analyses of environmental governance framework

In order to produce synergy and mitigate inconsistency, the requirements and objectives of other relevant legislative documents, established at international or national level, both within and outside the authority's jurisdiction were identified. Then approaches were suggested for the SEA and NTP to deal with such requirements. At international level

these documents contained the multilateral and intergovernmental initiatives, treaties, conventions and protocols etc. which were relevant to NTP and are applicable in Pakistan, while at national level these documents contained relevant Policies, Plans, Programmes, Strategies, Acts and Initiatives (PPPSAIs). Below matrix was used to document such analysis.

Relevant PPPSAIs	Objectives and requirements of the PPPSAI relevant to NTP	How these objectives and requirements of the PPPSIs might be taken on board by NTP or SEA

The requirements and objectives of above relevant PPPSAIs were then analysed for a sustainability approach (ecologically feasible, economically viable and socially acceptable) and it was find out that whether these requirements or objectives are sustainable for NTP.

3.2.2. Collecting and presenting baseline information

Baseline data allows environmental problems to be identified. It also forecast and monitors the relevant environmental impacts and helps in the development of SEA objectives.

Sufficient relevant information was collected on certain environmental issues that characterize NTP affected areas and future trends were identified for them. The relevant identified environmental sensitive aspects to be affected by NTP were Population and human health, Air, Climate, Biodiversity (flora and fauna), Water, Cultural heritage, Material assets, Landscape and Soil.

Baseline data on above environmental aspects were collated from a wide range of sources, including national government/agency websites, approved studies and information included in other PPPSAIs, which set the context for NTP preparation.

Below matrix was used to organize and present this kind of baseline information for above given areas.

Key issues or indicators	Quantified Information	Comparators and Targets	Trend	Issues / Constraints
Transport related environmental issue	The latest possible data for the country on those issues	Regional or international situation against which Pakistan transport situation can be compared, and what is the available target to overcome the issue	Trends where they exist and what is the future alarm	where the country is doing badly compared with the comparators or targets

3.3. Devising SEA objectives

SEA objectives are a standard way to consider the environmental effects of a policy. The purpose of SEA objectives is different from NTP objectives as it provides means which assess the environmental performance of a policy. Therefore, in order to find the effect of NTP objectives on the environment, SEA objectives were used as a standard yardstick to compare and assesse the NTP objectives. On the basis of this assessment, improvements and mitigation measures were suggested for the measures of the NTP. SEA objectives were derived from the information provided by review of baseline information and related environmental protection objectives of other PPPSAIs.

3.4. Compatibility analysis of SEA objectives

To ensure synergy and consistency and to remove any distortion, SEA objectives were tested for compatibility in three steps as below

- First the SEA objectives were assessed against the sustainability aspects to ensure that each of the aspect is addressed properly by SEA objectives.
- SEA objectives were also tested against PPPSAIs to ensure that its objectives and requirements were fully integrated into SEA objectives.
- At last SEA objectives were assessed against each other to find whether these objectives are compatible or incompatible and whether these objectives have some positive or negative effect on each other.

3.5. Compatibility assessment of NTP objectives against SEA objectives

Once it was made sure that all of the sustainability aspects and requirements of other relevant PPPSAIs are fully integrated into SEA objectives, they were used to test the objectives of National Transport Policy. The aim of testing NTP objectives against the SEA objectives was to find the inconsistencies and synergies between what the NTP is trying to achieve and priorities for environment. This information can help refine the implementation of actions and recommend mitigation measures to ensure that the NTP meets environmental objectives.

3.6. Impact assessment of National Transport Policy and proposing recommendations

SEA objectives and indicators were used as a standard yardstick to assess the impact of NTP and its objectives on the environment. The significance of the impact, its magnitude likelihood and severity for each of the policy measure were analysed and recommendations

were provided to improve positive effects and to mitigate the negative impacts of the policy measures. In the assessment process the following criteria was fallowed

- Evaluation of the environmental impacts (adverse or beneficial), its significance, severity, likelihood and certainty for each policy measure in relation to SEA objectives and indicators.
- Suggesting measures and recommendations to reduce/ avoid the adverse effect or its severity and enhance the positive impact.
- Impact uncertainty reduction or mitigation.

Below summary matrix was used to identify the interrelationships between effects associated with different SEA objectives and indicators.

SEA objectives	Indicators	Significance		Recommendations
		Symbol	Description	
SEA objectives used as a standard yardstick	Indicators to be assessed against each measure	What is the probability, severity, duration and certainty of the impact	Description of the effect on each indicator	What are the possible measures to improve the positive impacts and mitigate the negative impacts

3.7. Proposing measures to monitor the environmental effects of NTP implementation

An important step of the SEA process is monitoring the significant effects of NTP implementation on environment. The purpose of monitoring is to identify the corrective actions and to establish how well the NTP comply with SEA objectives during implementation.

A monitoring plan was established to check the condition of the indicators and issues outlined in table of baseline information after the implementation of NTP. The following table shows how it was possible to draw the monitoring plan.

SEA objective	Indicator	How often monitored	Who to monitor

RESULTS AND DISCUSSION

In Pakistan SEA is not yet a legal requirement by government and legislative bodies, nevertheless various international guidance documents recommend that the SEA process should start at the same time as the preparation of the Policy. This study was carried out when the first draft of the NTP has been already developed however now, suggested positive changes are expected as a result of this study.

4.1. Environmental Screening

Before substantive work is to be undertaken on the SEA, it is important to figure out if SEA is required for NTP. According to the European SEA Directive (Article 1); "an environmental assessment will be carried out for those PPPs which are likely to have significant effects on the environment" and hence SEA was considered must in article 2(3) of the same directive for transportation sector. Pakistan' EPA also requires EIA for transport related projects. Figure 4.1 below summarizes the EU/SEA Directive Regulations for screening requirements and elaborates that how NTP will require SEA.

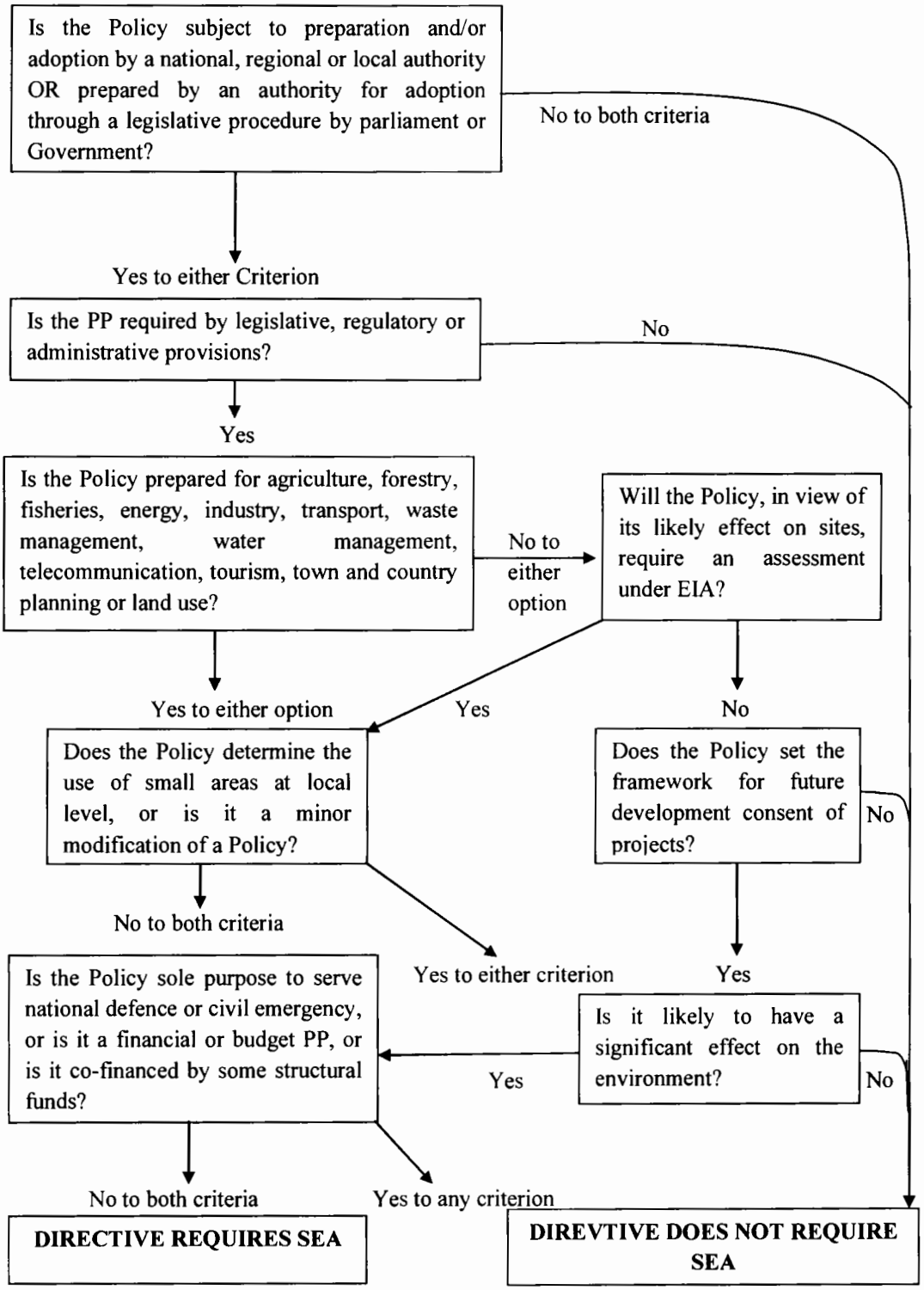

Figure 4.1: Criteria for Application of the SEA to PPPs (Adapted: ODPM *et al;* 2005).

4.2. Environmental Diagnosis

4.2.1. Analysis of Environmental Governance Framework

This stage provides information on the policy's relationship with other relevant PPPSAIs and helps in the identification of SEA objectives. Table 4.1 below lists potential policies, plans, programmes, legislation and other strategic documents that are relevant to the National Transport Policy and were reviewed and analysed for how they be applied to SEA and NTP.

Table 4.1: Analysis of relevant PPPSAIs

Related PPPSAI	Objectives or requirements of the PPPSAI relevant to NTP	Implication for NTP and SEA
	International level	
United Nation Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol, 1992	Pakistan ratified the UNFCCC at January, 2005. The ultimate objective of this Convention is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. An important international agreement linked to the UNFCCC is the Kyoto Protocol committing 37 industrialized countries to take action against Climate Change by reducing the emissions of GHGs responsible for global warming. It also provides measures to limit and/or reduce emissions of GHGs not controlled by the Montreal Protocol in the transport sector.	NTP should make specific reference to address climate change issue, especially through the policy of reducing the growth of motorized traffic through modal shift.
World conservation strategy (WCS), 1980	Requires the maintenance of essential ecological processes and life support system, the preservation of genetic diversity, and the sustainable utilization of ecosystems and species.	Protection and Sustainable use of ecological resources and biodiversity should be encouraged.
Convention on Biological Diversity, Rio de Janeiro, (CBD,1992)	There are 160 parties to CBD. Pakistan signed this convention on 5 June, 1992 and then ratified it in July, 1994. Article 6A of the Convention requires each Contracting Party to build up national plans, strategies and programs for the conservation and sustainable use of biological resources to benefit present as well as future generations. The Convention has three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources. Relevant aspects to transport are the sustainable use of components of biological diversity, the requirement for EIA, and the inclusion of biodiversity issues in SEA. A direct result of this Convention was Agenda 21 which is the concept of a global partnership for sustainable development.	The NTP should consider biodiversity in terms of whole ecosystems with its components rather than a specific protected site.

	National policies, strategies, plans and processes are crucial to achieve this. The four sections of Agenda 21 are: Social and economic dimensions; Conservation and management of resources for development; Strengthening the role of major groups; and Means of implementation.	
The United Nations Convention on the Law of the Sea (UNCLOS, 1982)	This convention came into force on 16th November 1994 and Pakistan ratified it on 26th February, 1997. Currently there are 160 contracting parties to the convention. This convention provides the rights of ownership and property within the marine environment to coastal states and imposing certain duties of environmental protection and safety to navigation. UNCLOS also include the rules for the Protection and Preservation of the Marine Environment (Part XII Arts 192-196), and EIA (Art. 206). States have the obligation to protect and preserve the marine environment. Regarding marine pollution States are to take "all measures consistent with this Convention that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities, and they shall endeavor to harmonize their policies in this connection". The Convention applies to all sources of pollution including pollution from vessels which is addressed in Article 211. The measures taken to prevent pollution should include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life. Convention also calls for EIA of planned activities that causes substantial pollution of or significant and harmful changes to the marine environment.	Implementation of the NTP (e.g. development of ports and harbors and other transport activities) could result in impacts to the marine environment; this infrastructure and activities should operate within the objectives of UNCLOS including aspects related to marine pollution, waste management and conservation of resources.
Ramsar Convention, 1971	Currently there are 159 contracting parties to the convention. Pakistan The Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat is an intergovernmental treaty signed in Ramsar (Iran) and was ratified by Pakistan in 1976. It provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. The convention amended in 1982 and demands signatory members to designate important wetlands for conservation in particular waterfowl habitats and the designation of Ramsar Sites to be protected from development.	Possible impacts of the NTP on wetland's biodiversity and habitat should be considered along with possible mitigation measures
UNESCO World Heritage Convention, (WHC, 1972)	WHC aims to protect and enhance the world's cultural heritage. It links together the concepts of nature conservation and the preservation of cultural properties. Pakistan ratified the WHC in July 23, 1976. Currently there are 6 confirmed properties of Pakistan inscribed on the World Heritage list. The Convention sets out the duties of States Parties to identify, protect, conserve, present and transmit the cultural and natural	NTP should set the right framework for safeguarding and enhancing cultural and natural heritage of the country.

	heritage to future generations. Also to ensure the effective and active measures taken for the protection, conservation and presentation of the natural and cultural heritage situated on its territory. The States Parties are also encouraged to integrate the protection of the cultural and natural and cultural heritage into regional PPPs.	
	National level	
National Environmental Policy, 2005	Requires protection, conservation and restoration of environment in order to improve quality of life of citizens through sustainable development. Relevant objectives: Conservation, restoration and efficient management of environmental resources; Integration of environmental considerations in policy making and planning processes; and Meeting international obligations effectively in line with the national aspirations.	The NTP should encourage the sustainable use of resources and should reflect on environmental issues in decision making
National Climate Change Policy, 2012	Relevant objectives of the policy requires sustained economic growth through addressing the challenges of climate change and conservation of natural resources; integration of this policy requirements in other inter-related national policies; and risk mitigation of the increasing impacts of climate change such as floods. Climate change policy also proposes certain policy measures for road transport sector such as; proper vehicle maintenance and reduction of emissions; provision of a fuel efficient public transport system and development of mass transit systems in metropolitan cities; use of bio-fuel in local transport; greater use of CNG; encouragement of non-motorized modes of travel, such as bicycle and walking for shorter distances and development of new pipelines for efficient oil transport. In aviation sector it requires new fuel efficient aircrafts; planning fleet up-gradation; Support the International Civil Aviation Organization's (ICAO's) initiative for carbon emission reduction through participation in its activities and initiatives. It also requires the provision, up gradation and expansion of efficient railway system and its network and development of inland waterways transportation system.	Transport significantly contributes to emissions and NTP should reduce it through encouraging sustainable modes of transport and to reduce reliance on the car through expanding railway network and mass transit systems in major cities.
National Forest Policy, 2010.	Forest policy aims to provide guidelines to the federal and provincial agencies for restoration, development, conservation and sustainable management of forests and allied natural resources to ensure sustainability of ecosystem functions, services and benefits for present and future generations of Pakistan. The policy also requires the integration of sustainable forest management practices into sectoral PPPs; the conservation of	NTP should encourage the sustainable use of resources (flora and fauna) and protect and enhance biodiversity

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	biological diversity, protection and sustainable use of indigenous flora and fauna.	
Pakistan Environmental Protection Act, (PEPA, 1997)	PEPA requires the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development. This act provides the law that the discharge or emission of any effluent or waste or air pollutant or noise must be in limits of National Environmental Quality Standards (NEQS). Also motor vehicles will operate only if its emission and noise level was in limits of NEQS.	PEPA is a national law and NTP must consider its regulations
National Sustainable Development Strategy (NSDS): Pakistan's pathway to a sustainable & resilient future, May 2012.	The broader vision of NSDS is to evolve a just and harmonious society in the country through promotion of a vibrant and equitable economic growth without overexploitation of natural resources with fair distribution of development dividends to all; in particular to the marginalized, poor and vulnerable in the society and to future generations. NSDS main strategies include; using the concept of strategic environmental assessments (SEA), payment for ecosystem services (PES), climate change and Sustainable Land Management (SLM) principles during making decision for policies, strategies, programs and development plans in Pakistan. Also include the implementation of the commitment made in Vision 2030 as mentioned above. It also requires the conservation, management and promotion of the future environment, the natural resources and life support systems, habitats, species and genetic diversity.	NTP should contribute to the strategies of the NSDS through consideration of such polices that lead to sustainable communities with a focus on the sustainable use of natural resources.
The Pakistan national conservation strategy (NCS), 1991	The main theme of the strategy is the conservation of natural resources through - Maintenance of ecological processes; - Preservation of biodiversity; - Restoration of degraded natural resources; - Sustainable and efficient use and management of natural resources; - Balanced and diversified sustainable development; - Conservation and improvement of best soils and sweet water. - Prevention from the deterioration of fragile ecosystems. Relevant core areas under NCS also include: - Protecting water bodies and sustaining fisheries - Increasing energy efficiency - Developing and deploying renewable sources - Preventing and abating pollution - Supporting institutions for common resources, and - Preserving the cultural heritage.	NTP should contribute to the strategies of the NCS through consideration of such polices that lead to a sustainable community with focus on the sustainable use of natural resources and energy efficiency.
National Energy Conservation Policy.	This policy requires energy demand satisfaction by indigenous resources; use of appropriate technological and policy measures for the reduction of energy intensity and stimulation of resources for energy conservation and regulation of energy	Transport is a high energy consuming sector and it should implement the

	management programs in all sectors of economy. The Policy also provides some short, medium and long term guidelines for energy conservation in the transport sector.	objectives of energy conservation and efficiency, and should follow the guidelines provided
Policy for Development of Renewable Energy for Power Generation, 2006	Mainstreaming renewable energy and greater use of indigenous resources and reduce the country's dependence on any single source particularly imported fossil fuels.	NTP should encourage the use of indigenous energy sources and deployment of renewable energy technologies.
Energy security action plan, 2011-30	For transport sector the plan mainly requires the use of CNG and indigenous energy sources in vehicles and in metropolitan cities public transport to reduce dependence on imported oil.	As above
Public private partnership policy and regulatory framework, 2009	This is a policy for private sector participation in national Highways, Motorways tunnels and bridges in Pakistan. The relevant requirement of the policy is the Pre-feasibility study of the projects to be processed. In Pre-feasibility study it must be make sure that the project is technically, environmentally, economically and financially viable. The relevant information to be provided in a Pre-feasibility study by NHA include - Full social and environmental analyses including the mitigation costs. - An assessment of the issues and risks to be included under a risk management plan.	NTP must consider and integrate with the requirement of this policy and must make sure the environmental information included in a Pre-feasibility study of a projects.
National Water Policy, 2005	Requires efficient management and conservation of existing water resources and its balanced and equitable use. Also requires better water quality for improved environment and improved flood control and protective measures. The relevant policy measures include - Proper maintenance of the existing infrastructure; - Establishment and promotion of flood zoning; and - Appropriate land use by avoiding growth of vulnerable developments in flood-prone areas.	NTP should address the objectives of water sources efficient use and its quality enhancement. Also transport infrastructure should not be the cause of increment in floods but rather be resilient to the floods.
National Drinking Water Policy, 2009	Requires the protection and conservation of water resources and access to safe and sustainable drinking water supply to the entire population of Pakistan by 2025.	Policy measures for water sources protection and conservation is required.
Pakistan water sector strategy,	Requires the improvement of surface and groundwater quality to	NTP should contribute it through

2nd volume, 2002.	acceptable standards by 2025; Preparation of flood management strategies for major infrastructure; and Flood Risk Planning to be adopted by all agencies as part of the planning process.	making the commitment towards the strategy goals achievement.
Disaster Risk Reduction Policy, 2013	The policy Vision: A Pakistan that build up its resilience to shocks from natural and man- made hazards with a sense of urgency, creating a solid base to address disaster risk reduction in vulnerable areas, while involving an increasingly wider range of stakeholders from government, civil society and private sector." It mainly requires the strengthening of an integrated disaster preparedness and response capacity; development of plan that considers and addresses disaster risks alongside environmental and climate change concerns; Strengthening the structural and non-structural resilience of key infrastructure and lifelines in Pakistan	Certain measures are needed to make the transport infrastructure resilient to the calamities of climate change like floods and storms.
Self-Monitoring and Reporting tool (SMART): Initiative by EPA, 2006.	The nationwide launching of SMART was held on 8th March, 2006. The requirement of SMART is to conduct the analysis of industrial emissions and effluents on their own and provide the results to Environment Protection Agency (EPA).	Transport sector is accountable to this requirement and NTP should address this requirement.
National Impact Assessment Program (NIAP)	The program seeks to promote sustainable development in Pakistan by strengthening the EIA process and introducing SEA in development planning.	NTP should consider the SEA outputs in its policies
National Sanitation Policy, (2006)	To ensure an open defection free environment, safe disposal of solid, liquid, and industrial waste and promotion of health and hygienic practice.	NTP should ensure the minimization of waste and increase the use of secondary and recycled materials
Pakistan national wetlands policy, 2009.	The relevant emphasis of this policy is on co-ordination and collaboration between agencies and sectors on wetland issues encouraged from local to international levels and harmonizing national wetland policy with other policies.	NTP shall harmonize its objectives with the requirements of wetlands policy.
Biodiversity Action Plan Pakistan, 1999	The plan aims to promote the conservation and sustainable use of Pakistan's biodiversity, and the equitable sharing of benefits arising therefrom, for the well-being and security of the nation. Relevant objectives to NTP contain the integration of biodiversity conservation measures into sectoral plans and programmes and enhancing the enforcement of biodiversity-related laws. Also, strengthen the protected areas system in Pakistan and its contribution to biodiversity conservation; Conserve biodiversity outside protected areas;	NTP should make framework for biodiversity conservation and management and integrate it in its objectives and measures that effects biodiversity.

	Establish, monitor, and regulate sustainable use limits of selected biological resources; and Protect and encourage community-based biodiversity management systems	
National Strategy and Action Plan for Mangroves for the Future, 2010	Relevant requirements to NTP include, the conservation and restoration of coastal ecosystems as key assets in the Indian Ocean; management of coastal ecosystems sustainably, equitably and effectively; and strengthening the environmental sustainability of coastal development.	NTP should develop strategies for coastal environment management and preservation.
Antiquities Act, 1975	This act prohibits destruction, damage and defacement of antiquities. It restricts any development plan or scheme or new construction within 200 feet (60m) of a protected immovable antiquity, except with the approval of the Director General of the Department of Archaeology and Museums, GOP. Even the Government may prohibit or restrict excavation, blasting, heavy vehicle movement or any other such activity in the vicinity of the immovable antiquity.	This is a national law and NTP should follow it.
National policy and strategy for Fisheries and aquaculture development in Pakistan, 2006	This policy requires the environmental conservation and abatement of over-exploitation of marine fisheries resources. It also states to improve transportation of aquatic products and its access to international markets.	NTP should consider these objectives especially while dealing with the ports and shipping policies.
Draft national rangeland policy, 2010	Requires the conservation and maintenance of rangeland biodiversity.	Still in draft and not finalized.
Liquefied Natural Gas (LNG) policy, 2011	LNG policy requirement is to maximize the utilization of indigenous energy resources.	It is the need of the time and NTP should address this objective.
National Power Policy, 2013	Relevant goal of the power policy is to create a culture of energy conservation and responsibility.	As above
Pakistan Clean Air Program (PCAP)	It's a suggested program and still not approved or implemented by government. This program suggest some measures as below Campaign against excessive mixing of lubricating oil in fuel of two stroke vehicles. Restriction on conversion of vehicles from gasoline engine to secondhand diesel engines High pollution spots in cities may be offset through traffic management Improvement of energy efficiency in vehicles and industry Shoulders along roads should be mettled	PCAP is an unapproved program and is still under review; therefore NTP cannot consider this program until the reviewed objectives are known.
Millennium development goals (MDG),	The United Nations Millennium Declaration arose from the meeting of 189 states of the UN in New York, September 2000. The Declaration was aimed at working toward a world of peace	This is a national commitment and NTP must play a

2000-2015	and security for all and led to agreement on the adoption of the eight MDGs. Of which7thMDG is relevant to the SEA of NTP i.e. ensure environmental sustainability. Under MDG 7, Pakistan set the target to integrate the principles of sustainable development into country PPPs and reverse the loss of environmental resources. Also to halve the proportion of the population without sustainable access to safe drinking water by 2015.	role in MDGs realization.
Pakistan Vision, 2030	The major requirements of vision 2030 relating to NTP are - To make employment and employability, a central theme in economic and social policies, with special emphasis on the rights of women. - To eliminate absolute poverty and ensure social protection for the weak and the vulnerable; - To prepare for climate change, and its likely unfavorable implications; - To minimize wastage of natural resources as an important tool for preserving inter-generational equity. Also Introduction of urban public transport (with CNG as fuel) and mass transit systems to reduce air pollution. And Strict enforcement of environmental and pollution standards; and enforcing the ban on persistent organic pollutants.	NTP is aligned with the principles of the Vision 2030.

From the analysis of the above relevant PPPSAIs' requirements and objectives it is clear that these PPPSAIs greatly emphasis on some of the key environmental, social and economic aspects like; Biodiversity (flora and fauna), Population and human health, Air, Climate change, Water, material assets, Landscape, Cultural heritage Soil and land use. Therefore, in order to make NTP a sustainable policy, it should consider the above mentioned aspects in its decision making process because these areas also addresses the three pronged approach of sustainability i.e. economically viable, ecologically feasible and socially acceptable. All of the areas directly or indirectly address each of the wings of sustainability, however below table shows the aspects that are directly connected with and how address each of the wings of sustainability.

Table 4.2: Sustainability approach of the relevant mentioned areas in PPPSAIs

Sustainability wings	Addressed by the relevant sustainability aspect
Sustainable economic development	Material assets, Landscape, Cultural heritage, Population and human health (poverty eradication, employment, health issues etc.)
Environment	Biodiversity (flora and fauna), Air, Climate change, Water, Soil and land use.
Social values	Population and human health (poverty eradication, employment, health issues etc.) and Water

4.2.2. Environmental, Health and Social Baseline Information

The above mentioned aspects sets the context for the collection of baseline data and therefore the technical scope of the SEA is based on a range of issues that are relevant to these aspects and NTP. These issues will provide the indication for formulation of SEA objectives. The European SEA Directive (Annex 1 (f)) also requires these aspects to be considered when looking at the environmental impacts of the Policy.

Baseline data on the above relevant issues and for each of the SEA objective was collected which is mainly in the form of performance indicators as shown in table below. The following problems were encountered when collecting the baseline information:

- There was a lack of existing data within the study area for most of the SEA objectives and indicators.
- For many of the issues and indicators it was difficult to pick out any trends or even identify the situation.

However, Empirical evidence shows that SEA at the policy level normally focuses on a selected number of key issues (Fischer, 2002). Considering the difficulties in assessing comprehensive and complex nature of national levels decision-making for example NTP, for practical reasons, it may be preferable to focus on one or two indicators only, such as energy consumption and CO_2 emissions for climate change (Fischer, 2006).

The numbering in the table below shows the relevant sources of information and are fully described in appendix B for the purpose of effective monitoring process. Data for many indicators are in qualitative form or either more elaborative and therefore are discussed in detail in appendix A.

Table 4.3: NTP related baseline information on key environmental issues

Key issues Or indicators	Quantified Information	Comparators or Targets	Trend	Issues / Constraints
Population and human health				
Population in Pakistan (in millions)	157.97mln in 2005 173.14mln in2010 182.14mln in 2013 [1]	Pakistan is 6th most populous country in the world [2]	Increasing and will be 242.06mln in 2030 [2]	Unfavourable situation: There is expected to be an ageing population as total fertility rate and annual growth rate is decreasing which can increase burden on transportation [2].

Employment in Pakistan (in millions)	46.95mln in 2005 53.21mln in 2010 56. 58mln in 2013 [2]	MDGs target is employment for all till 2015 [3]	Trend is increasing	Unable to identify situation: Number is increasing but goal not achieved.
%age employment to population ratio (15^{+} age)	48.79% in 2005 51.29% in 2010 51.59% in 2013 [1]	Ratio is lower than average of south and east Asia both [3]	employmen t ratio is steadily increasing	Unable to identify the situation
%age employment share by transportation	5.73% in 2005 5.24% in 2010 4.98% in 2013 [2]	The share is lower than other major sectors [2, 3]	Trend is decreasing	Unfavorable situation for transportation sector
%age contribution of transport sector to GDP/year	12.44% in 2005 13.30% in 2010 13.36% in 2013 [4]	The share is lower than other major sectors [4]	Trend is slowly increasing	Unable to identify the situation as, transport sector costs 4–6% of GDP/year also
%age of population with proper accessibility of transportation	See appendix A or [2]	Service performance is low as compared to other regional countries. No targets	Trend is increasing slowly as compared to population growth	Unfavorable situation: Road sector services are insufficient for population demand. Performance of other modes is worsening.
Mode of travel to work (using cars, public transport, cycle or walk etc.)	No specific data, however no. of two wheelers and cars is increasing (see appendix A)	No information available	Increasing	Non favorable situation
% of transport lines with proper corridors for communities	No information	No targets available	No data	Unfavorable situation: no commitments made for this particular issue
Data on traffic accidents and its severity	See appendix A	Rate is higher than South Asian average and many other developing countries [5].	No significant change	Unfavorable situation as there is no significant decrease in number of accidents and casualties and no targets sat.
%age of accidents due to type of vehicles	Most of the accidents are due to two wheelers [6]	No information	Two wheelers are increasing rapidly.	Unfavorable situation
Crime rate in transport sector	No data available	No targets available	No Data	Unfavorable situation as, no targets available

Noise and Vibration in major cities	See appendix A	National standards for noise ranges between 45-75db [7]	Levels are higher than allowable limits	Unfavorable situation
Air				
Population density in Pakistan (people/km^2)	204.92 in 2005 224.61 in 2010 236.28 in 2013 [8].	Pakistan is 6th most populous country in the world [2].	Increasing	Unfavorable situation: Burden will increase on transportation.
Urbanization and migration rate to urban centre s	See appendix A	Population growth rate is higher in cities than rural areas. No targets defined	Increasing fast	Unfavorable situation: Burden will increase on transportation that can lead to deteriorate air quality.
Number of motorcycles/ scoters, rickshaws and motor cars on the road.	See appendix A	Increasing more rapidly than other transport modes. No targets	Increasing quickly	Unfavorable situation: it will increase air quality (e.g. PM) and health problems.
Particulate matters (SPM and TSP) in Pakistan	See appendix A	Level is above than WHO Guideline values.	Level is increasing	Unfavorable situation: PM is #1 air pollutant in Pakistan [9].
Level of PM_{10} in major cities of Pakistan	Hourly average Conc. (ug/m^3) in 2000 at Lahore: 895 Rawalpindi: 709 Islamabad: 520 [8] For other cities See appendix A	Levels are higher than other most polluted cities of the world and WHO guideline values [10].	Based on the sporadic studies, trend of PM in Pakistan is increasing [10].	Unfavorable situation: PM is the most serious air pollutant in the country especially fine and ultrafine particles [11].
$PM_{2.5}$ (µg/m^3) pollution, mean annual exposure in Pakistan	37.28 in 2005 38.10 in 2010 [1]	Level is above WHO guidelines and Pakistan ambient air quality standards [12]	Trend is increasing	Unfavorable situation: fine and ultrafine particles are most serious air pollutant in the country [11].
%age of population exposed to $PM_{2.5}$ levels	97.76% in 2005 97.80% in 2010 [1]	High %age of population exposed than world average.	Trend is increasing	Unfavorable situation

Sulfur content in High Speed Diesel	1.0 in 2004/05 [13] 0.8 in 2009/10 [13] 0.6 in 2013/14 [2]	Higher than Euro II, III and IV standards. MDG target for 2015 is 0.5–0.25 [8, 9].	Target is on track [9]	Unable to identify situation Plan to reduce sulfur content in fuels failed to implement in time [10].
Transport related Sulfur dioxide (SO_2) emissions (000tons) in Pakistan	52 in 1977/78 58 in 1987/88 105 in 1997/98 [14]. Also, see appendix A for other major cities	Levels are 2-3 times higher than WHO guideline values ($20\mu g/m^3$) for 24hr [10]	level is increasing	Unfavorable situation: Diesel-fueled vehicles are the main source of SO_2 and its number is also increasing.
Transport related CO emissions in Pakistan	592.15Gg in 1994 876.34Gg in 2008 [15, 16]. Also, see appendix A.	Level is higher than WHO guidelines especially during day time in urban centre s [10].	Level is increasing	Non-favorable situation: vehicles growth rate and poor mass transit system are the main sources.
Transport related NOx emissions in Pakistan	172.76Gg in 1994 346.73Gg in 2008 [15, 16]. Also, See appendix A.	Level is higher than WHO guideline values [8].	Increasing	Unfavorable situation: CNG vehicles are the main source [17]
N_2O emissions from transport sector	0.17Gg in 1994 0.24Gg in 2008 [15, 16].	No guideline values available	Trend is increasing in future	Unfavorable situation: getting worse
Nitrogen dioxide (NO_2) emission levels in urban centre s of Pakistan.	See appendix A	NO_2 Levels are slightly higher than the WHO guideline values [10].	No trend available. Current Level is above national standards.	Unfavorable situation: 2nd high-risk pollutant in the country. It can also lead to secondary particulates and ground level ozone formation.
Non-methane VOCs from transportation	17.79Gg in 1994 164.0Gg in 2008 [15, 16].	No guideline values available	Level is increasing	Unfavorable situation: getting worse
Hydrocarbon (Methane and Non-Methane) emissions in major cities.	See appendix A	Exceeding the prescribed US EPA limit of 0.24 ppm [17].	No trend available	Unfavorable situation: Sources are evaporative losses and leakages from vehicles.

Ozone (O_3) level in major cities of Pakistan.	See appendix A	No targets available	Level is increasing.	Unable to identify situation: source can be other.
Annual deaths due to Urban air particulate pollution	Premature deaths Among adults are 22,000 (around). And among children under 5, are 700 [18]	For comparators see appendix A No targets available	Increasing as no remedial actions available	Non-favorable situation
Cost effects of urban air pollution on human health	Rs 62-65 billion, or around 1% of GDP per year [18]	Cost is higher in Pakistan than in the rest of South Asia	Increasing (See appendix A).	Unfavorable situation
Climate change				
% of / total energy consumption in transport sector	27% of 9.72mtoe in 2006/07 31.4% of 12.56mtoe in 2011/12 [19].	Growth rate of energy use is highest in transportation than any other sector [19].	Increasing fast	Unfavorable situation: this situation will contribute to high GHG emission in future.
Renewable energy consumption in transport sector	Hydro: 971toe in 2006/07 81toe in 2011/12 [19]. No consumption of other renewable energy sources	No targets available	Trend is decreasing	Unfavorable situation: electricity is the only source used in overall sector.
Per capita energy consumption in Pakistan	445.4kgoe in 2000 482.5kgoe in 2005 486.9kgoe in 2010 [1]	lower than the world average and other regional major countries [20]	Increasing steadily	Unable to identify situation
Per capita CO_2 (mt) emissions	0.74mt in 2000 0.86mt in 2005 0.93mt in 2010 [1]	As above	Trend is increasing	Unable to identify the situation
CO_2 emissions per unit of energy consumption (kg/kgoe)	1.66 in 2000 1.79 in 2005 1.91 in 2010 [1]	CO_2 intensity is lower than the world average and other regional countries [20]	Trend is increasing	Unable to identify situation: Intensity is lower than the world average however, on the other hand trend is also increasing.
Total GHG emissions of Pakistan (Mt of CO_2 equivalent)	181.7 in 1994 309.4 in 2008 [15, 16]	Pakistan emits 0.8% only of the total world GHG emissions [20]	Trend is increasing	Unable to identify the situation: emissions are increasing but rate is lower than other major countries

Total CO_2 emissions (kt)	106449.34 in 2000 136636.08 in 2005 161395.67 in 2010 [1]	Lower than the world average [20]	Trend is increasing	Unable to identify the situation
Transport related CO_2 emissions	26.87Mmt in 2000 28.67Mmt in 2005 34.76Mmt in 2010 [1]	No targets available	Trend is increasing	Unfavorable situation
Transport related CH_4 emissions	1.9Gg in 1994 6.5Gg in 2008 [15, 16]	No targets	Trend is increasing	Unfavorable situation
Temperature rise in Pakistan	During 1960-2010, mean surface air temperature has risen at the rate of 0.099 °C per decade resulting in total change of 0.47 °C. And during the last century, average annual temperature increased by 0.6°C [20].	IPCC predicts higher rise of temperature in Pakistan as compared to average global temperature increase [20].	it is expected to increase further in the range 1.3-1.5 °C by 2020s, 2.5-2.8°C by 2050s, and 3.9-4.4°C by 2080s [20].	Unfavorable situation: temperature raised drastically in the last decade which made it the warmest decade in Pakistan [20].
Monsoonal Precipitations change	See data on Pakistan metrological department website	Intense rainfall occurs during monsoon for last few years as compared to other regional countries	Increases	Unfavorable situation: high precipitation change leads to sever floods and causes destruction to transportation
Transport infrastructure development and flood risk	Some cases have been observed that unsustainable transport infrastructure augment floods destruction rate. E.g. motorway road was blasted in Charsada for flood water flow in 2010.	No targets available	Trend is increasing as the frequency and intensity of floods increases	Unfavorable situation: New transport infrastructure developments are still ongoing in flood prone areas of Pakistan.
Annual cost (PKR million) of damage to transport sector due to flooding	132800 (approx.) in 2010. 26468 in 2011 [21]. Transport related data is not available for other years.	Damage of flood 2010 in Pakistan is larger than other major disasters in the world [21]	Frequency and severity of floods are increasing	Unfavorable situation

Electricity generation from renewable sources (MWh)	Hydro power: 17194 in 2000 30862 in 2005 31811 in 2010 [1] Generation from other renewable sources is negligible [22]	At least 9700MW is targeted to be generated from other renewable sources by 2030 [22].	Target for renewable sources is still off track	Unfavorable situation: this small quantity is generated only from hydro while generation from other renewable sources is negligible
Proportion (%) of electricity generated from renewable sources	Hydro power: 25.24% in 2000 32.89% in 2005 33.68% in 2010 [1]. No other renewable source is used [22]	At least 5% is targeted to be produced from other renewable resources by 2030 [22].	Target for renewable sources is still off track.	Unfavorable situation: proportion is very low and increases slowly as compared to increase in demand.
Renewable Energy Potential (by type)	See appendix A	No target	No trend	Favorable situation: most of the potential is easily available for transportation
Water				
Inland water quality in Pakistan	See appendix A	No targets available	Water quality is declining	Unfavorable situation
Ground water quality	See appendix A	No targets defined	As above	Unfavorable situation
Per capita water availability	2,900 m^3 in 1981 1611 m^3 in 1991 1250 m^3 in 2001 1,100 m^3 in 2010 [23]	Pakistan is one of the most water stressed countries in the world No targets found	Water availability is declining as it will be 800 m^3 by 2025 [23]	Unfavorable situation: This situation will worsen as the population increases and climate change effects decrease water availability [23]
Biodiversity (flora and fauna)				
Forests cover (% of total land area) including State and private forests/ farmlands	4.9% in 2004/05 5.2% in 2009/10 5.2% in 2013/14 [13, 2]	Pakistan is among the low forest cover countries. MDG target is 6.0% till 2015 [13, 2]	Target is off track [2].	Unfavorable situation as according to the data of world bank and IUCN, forest cover in Pakistan is decreasing rather than increasing.
Protected area for wildlife conservation (% of total)	11.3% in 2004/05 11.5% in 2009/10 11.6% in 2013/14 [13, 2].	MDG target is 12% for 2015 [13].	Target is on track [2]	unfavorable situation: target not met
Acidification and eutrophication in water bodies	No specific data for Pakistan	No targets available	Level is Increasing in world's oceans [24]	Unfavorable situation as it will affect the oceanic biodiversity

Status trend of BAP mentioned threatened ecosystems/ species	No quantitative information however, see appendix A for the list of threatened ecosystems	No targets available	No trend	Unable to identify situation due to limited information
Area of Greenfield land lost and level of damage to green belts along roads due to transportation development	No specific data however we can see the decreasing level of green belts due to transport projects like metro bus projects in Lahore and Islamabad. Also, see EIA results of transport projects	No data	Extent of green belts is decreasing	Unfavorable situation
Landscape and cultural heritage				
Road density in protected and conservation areas (road km/ land km^2)	No proper data however total road density increased from 0.31 to 0.32 km/km^2during 2001-11 [1].	Road density in Pakistan is low compare to Bangladesh, Sri Lanka and India [25].	Roads are increasing but rail lines are decreasing	Unable to identify situation: incomplete information
%age of well-designed roads (transport functionality)	No proper data however See appendix A for high and low type roads	No targets defined	%age of paved roads is increasing	Unable to identify situation: limited information
Deterioration of buildings and monuments due to Air pollution and vibration.	e.g. Decay of Tomb of Jahangir at Shahdara, Lahore [26], Lahore fort and Stone Monuments of Dharmarajika, Taxila	No targets available	Increasing air pollution will augment the problem	Unfavorable situation
% of cultural heritage sites accessible by public transport	No information	No targets	No data	Unable to identify situation
Number of visitors to museums, and heritage sites	3041037 in 2008 2634531 in 2010 3192097 in 2012 [4]	No target	No clear increment	Unfavorable situation
% of GNP derived from heritage tourism	No proper data	No targets	No data	Unfavorable situation as there is no significant increase in tourism

No. of people employed in heritage, museums and conservation services	No proper data	No targets available	No data	Unable to identify situation
Soil and land use				
Increase in roads and railways/ area of soil lost to impermeable surfaces (Soil sealing and compaction)	See appendix A for increase in roads and railways	No targets	Problem will rise due to increase in transport lines	Unfavorable situation
Soil erosion, degradation and loss of topsoil	No proper data for transport sector	No targets available	No data	Unfavorable situation because of increase in transportation infrastructure
Diffuse Soil Contamination through excess of SO_2, NOx, and NH_3 etc.	See appendix A and previously defined indicators for levels of SO_2, NOx etc.	No targets defined	Problem will rise due to air pollution upsurge	Unfavorable situation: Acidifying contaminants (SO_2, NOx, and NH_3) contaminate the soil.
Land contaminated by other transportation activities	No proper data	No targets available	No information	Unfavorable situation because of increase in transportation infrastructure
Area of proposed new development on Greenfield sites	No proper data	No target	No data	Unfavorable situation because of increase in transportation infrastructure
Material assets				
Total annual volume of waste generated, Municipal waste arising in Pakistan	Solid waste ranges among 0.283 - 0.612 kg/capita/day [27]. Also see appendix A for waste generation in some major cities	No targets	Waste growth rate is 2.4% per year [27].	Unfavorable situation
Proportion of waste recycled/ disposed	No proper data	No targets	No Data	Unable to identify situation

4.3. SEA objectives

SEA objectives are widely used to ensure that the right level of environmental consideration is achieved. These objectives and indicators were used as a methodological yardstick against which the environmental effects of the draft NTP were tested. In light of the existing relevant objectives of other national PPPASIs and available baseline information, the following are the best chosen SEA objectives.

Table 4.4: Strategic Environmental Assessment objectives

SEA objectives	Indicators
1. Improve accessibility to vital services and facilities for those without a car and to reduce community severance. 2. Enhance employment opportunities and expand prospects for sustainable economic development.	• Public accessibility by transportation
	• Distance travelled to work
	• Mode of travel to work
	• % of transport lines with proper corridors for communities (severance reduction)
	• %age employment share by transport
	• Share of transport sector to GDP (profit to cost ratio)
3. Improve transport safety (reduce casualties) and security (crime and the fear of crime).	• Number of casualties and accidents
	• Increasing number of two wheelers and other accident causing vehicles
	• Crime and robbery rate
4. Mitigate the impact of noise and light pollution at major urban centre s. 5. To maintain and manage accessibility and local character of the landscape and green spaces.	• Noise pollution in major traffic zones
	• light pollution, Smog, night blight and haziness
	• Total area of woodland/extent of tree cover
	• Area of Greenfield lost and level of damage to green belts and designated landscapes along transport lines
	• Number of visitors to national parks and open spaces
	• Street clutters (sign boards and pamphlets etc. along road sides)
	• Transport infrastructure functionality (well-designed transport lines)
	• Road density in protected and conservation areas
6. To maintain the conservation status of historic environment and heritage assets with known cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets where feasible.	• Deterioration of buildings and monuments due to air pollution and vibration.
	• Number of visitors to cultural sites
	• % of cultural heritage sites accessible by public transport
	• % of GNP derived from heritage tourism
	• Number of people employed in heritage, museums and conservation services
7. To sustain and enhance biodiversity, the viability of endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• % cover, area and condition of protected areas and forests
	• Level of damage to green belts along roads
	• Status of BAP recognized threatened ecosystems and species

	• habitat fragmentation
	• Acidification and eutrophication in water bodies and their impacts on oceanic biodiversity
8. To minimize the production of waste, and promote the sustainable use of natural resources, secondary and recycled materials.	• Total annual volume of waste generated, Municipal waste arising
	• Proportion of waste recycled/disposed by method of disposal
9. To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	• Increase in the Energy consumption
	• Consumption of renewable energy by transportation
	• Quantity of electricity generated from renewable sources
	• Proportion (%) of electricity generated from renewable sources
	• Renewable Energy Potential (by type)
10. Maintain and improve air quality particularly in major cities.	• Increase in the level of PM
	• levels of key air pollutants (SO_2, Nox, N_2O, NO_2)
	• Migration rate to urban centre s
	• Population growth rate in urban agglomerations.
11. Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	• %age of Population exposed to levels of PM
	• Increasing level of rickshaws and two wheelers
	• Increase in the number of private motorcars
12. To ensure GHG emission level is not exceeding the national and international limits acceptable.	• Increase in the energy consumption
	• Increase in GHG level
	• Temperature rise in Pakistan
13. Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Increase in the intensity and severity of floods
	• Annual cost of flooding (to insurers, to authority)
	• Monsoon contingency plans prepared
	• % of land with impermeable/sealed/compacted surface with transport infrastructure
14. To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil.	• Area of proposed new development on Greenfield sites
	• Area of soil lost to impermeable/compacted and sealed surfaces
	• Soil degradation and loss of topsoil
	• Land contamination
15. Minimize the adverse effects of transport on fresh water quantity and quality of inland, marine and ground water.	• Excess of nitrogen, ammonia and acid critical loads
	• Unsustainable transport infrastructure development.
	• Decrease in Per capita water availability
	• Decreasing quantity of fresh water sources
	• Deteriorating quality of water sources
16. To integrate national transport policy with other Government policies and objectives.	Relevant objectives of
	National Environmental Policy, 2005
	NSDS, 2012
	National Climate Change Policy, 2012
	National Forest Policy, 2010.
	National Drinking Water Policy, 2009
	PEPA, 1997

Disaster Risk Reduction Policy, 2013
National Conservation Strategy, 1991
Biodiversity Action Plan Pakistan, 1999
National Energy Conservation Policy

4.4. Compatibility Analysis of the SEA objectives

4.4.1. Compatibility assessment of SEA objectives with sustainability aspects

The following table shows the interrelationship amongst the 16 objectives and sustainability aspects mentioned above, to ensure that which of the objectives mostly address which of the sustainability aspects. The number of the objective is placed in order to their relation with the concerning aspect. Each of the former objective addresses the aspect more than the following ones.

Table 4.5: Inter-compatibility assessment of SEA objectives with sustainability aspects

Sustainability aspect	Addressed by SEA objective No.
Population and human health	1,2,3,4,5,6,10,11,16
Biodiversity (flora and fauna)	7,13,5,16,1
Air	10,11,12,16
Climate change	12,13,9,10,11,16
Water	15,8,14,7,13,16
Soil	14,8,7.5,16
Cultural heritage and landscape	5,6,4
Material asset and economic development	8,2,5,6,7,1,13,14,15,3

4.4.2. Compatibility assessment of SEA objectives and sustainability aspects with PPPSAIs requirements

The following table shows the objectives and aspects which mostly satisfy the requirements of the above mentioned PPPASIs. The name of the aspect and number of the objective is placed in order to their relation with the concerning PPPASI. Each of the former aspect and objective addresses the PPPASIs requirements more than the following ones.

Table 4.6 Inter-compatibility assessment among SEA objectives and PPPSAIs objectives

PPPASI requirement	Addressed by Sustainability aspect and SEA objective no.
International level	
UNFCCC and Kyoto Protocol, 1992	Climate change 12
World conservation strategy (WCS), 1980	Biodiversity (flora and fauna) 7
Convention on Biological Diversity, Rio de	Biodiversity (flora and fauna)

Janeiro, (CBD,1992)	7
The United Nations Convention on the Law of the Sea, (UNCLOS, 1982)	Biodiversity (flora and fauna) and water 7 and 15.
Ramsar Convention, 1971	Biodiversity (flora and fauna) 7
UNESCO World Heritage Convention, (WHC, 1972)	Cultural heritage 6
National level	
National Environmental Policy, 2005	All topics 8, 14, 15, 16, 10, 7 and 5
National Climate Change Policy, 2012	Climate change, Air, water, soil, Biodiversity 13, 11, 12, 9, 10, 14, 15, 16, 7 and 5
National Forest Policy, 2010.	Biodiversity (flora and fauna), water and Soil 7, 15, 16 and 14
Pakistan Environmental Protection Act (PEPA), 1997	All topics except population and human health 10, 12, 4, 14, 15 and 7
National Sustainable Development Strategy (NSDS), 2012.	All topics 7, 8, 10, 14, 15, 16, 12 and 13
Pakistan national conservation strategy (NCS), 1991	Biodiversity, water, soil, air and cultural heritage 7, 8, 9, 10, 14 and 6
National Energy Conservation Policy.	Climate change and Air 9, 11 and 16
National Water Policy, 2005	Water and climate change impacts 15 and 13
Energy security action plan, 2011-30	Climate change and Air 9
National Drinking Water Policy, 2009	Water 15
Disaster Risk Reduction Policy, 2013	Climate change 13 and 16.
National Sanitation Policy, (2006)	Material assets, Population and human health 8
Pakistan national wetlands policy, 2009.	16
National Action Plan for Mangroves for the Future, 2010	Biodiversity (flora and fauna) 7
Antiquities Act, 1975	Cultural heritage 6
National Impact Assessment Programme	All topics and objectives
Pakistan Vision, 2030	All topics 2, 13, 8...

4.4.3. Compatibility assessment of the SEA Objectives against each other

Below matrix was created to test compatibility of SEA objectives with each other. With the help of below legend, this matrix identifies whether the above 16 SEA objectives

are compatible or incompatible and whether these objectives have some positive or negative effect on each other.

Legend: Positive effect = P+; Negative effect = P-; Compatible = √; Incompatible = X; No relationship/link=0, Uncertain = U.

Table 4.7: Intra-compatibility assessment of SEA objectives

2	P+													
3	√	P+												
4	√	√	P+											
5	√	√	√	P+										
6	√	P+	√	P+	P+									
7	√	√	√	√	P+	P+								
8	0	P+	0	0	P+	P+	P+							
9	√	0	0	√	0	0	0	P+						
10	P-	0	P+	P+	√	P-	P+	√	P+					
11	√	√	√	√	0	0	0	0	√	P+				
12	P-	0	0	0	√	P-	√	√	P+	√	√			
13	U	√	0	0	√	U	P+	√	P+	√	0	P+		
14	U/P-	0	0	0	√	U/P-	P+	P+	√	P+	0	√	P+	
15	U/P-	0	0	0	√	U/P-	P+	P+	0	P+	√	√	P+	P+
16	P+	0	0	√	√	0	P+	P+	P+	P+	0	P+	P+	P+	P+
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

While having assessed the SEA objectives against each other, it has been found that most of the objectives are compatible or have positive effect on each other, while some of them have no relationship/link. Only few negative effects and/or some uncertainty were found particularly for the term of "accessibility" in objective 1 and 6.

The relationship of accessibility with air pollution and emission levels was found to be negative because there is the possibility that increasing access to services and facilities through the provision of more bus services and community transport could contribute to local air pollution and increasing emission levels. Same for maximizing opportunities for visitors to cultural and heritage sites could mean that additional infrastructure is provided to access these sites, which could impact on local air pollution and increasing emission levels.

The relationship of accessibility with the problem of climate change impacts like flooding was found uncertain and will depend on implementation. If the additional transport infrastructure developed was unsustainable and neglecting the problem of floods then

certainly the problem will increase. On the other hand if that transport infrastructure development was sustainable and take account of the problem like to use the porous materials and corridors for flood waterways then the situation will remain harmless.

The term accessibility was also found to be negative and uncertain with soil and water quality objectives. Improving accessibility means provision of more bus services and community transport, which can lead to excess of emissions (NH_3, N and acid critical loads) and could contribute to diffusion of soil and increasing eutrophication. Also unsustainable additional infrastructure development for accessibility could have negative impact on soil sealing and compaction and water quality. However here the impact could be uncertain and depends on implementation. And this problem can be handled up to some extent through the use of porous materials in transport infrastructure.

4.5. Compatibility assessment of NTP objectives against SEA objectives

The broad goals of the draft National Transport Policy are

- Supporting the goals of MTDF (2005-10), reconstruction, modernization, meeting basic needs, economic growth, improving efficiencies, human resources development and facilitation of decision making
- Fulfilling the customer chosen criteria for accessibility
- Improving competitiveness through greater effectiveness and efficiency, and to better meet the needs of different customer groups, both locally and globally
- Investment in a cost effective way that satisfy Government's broad development objectives and social, economic or strategic investment criteria.
- Achieving above objectives in a way that is economical, environmentally sustainable, energy efficient and minimizes negative effects.

However below core policy areas provide the main objectives of the Policy which had been subjected to assessment.

I. Road infrastructure

- Reduce operating costs
- Optimize extraction and use of resources and asset management
- Improve accessibility and road safety. Further

- Management is answerable to

  i) Improve the levels of mobility and accessibility of people and organizations, and

  ii) Manage negative environmental effects, social impacts and energy efficiency.

II. Road Services

To enhance safety, security and service provision; and reduce transport service costs and environmental impacts.

III. Railway Sector

- Revitalization of rail services on commercial principles, such as cost recovery and financial viability,
- Improving reliability and performance,
- Enhancing passengers and freight haulage rail services to support in-country and international trade.
- The promotion of an efficient and effective, coordinated, integrated, affordable, safe, reliable and environmentally friendly land passenger transport system in urban and rural areas, accountably managed to ensure that people and freight experience improved levels of mobility and accessibility.

IV. Ports and Shipping Sector

To improve efficiency and facilitate trade through improving affordability and reliability for shippers and therefore, end-users while reducing shipping and port costs.

V. Airport and Civil Aviation Sector

- Maintain a competitive civil aviation environment,
- Increase our global connectivity,
- Enhance safety, security and regularity,
- Promote viability and reduce financial burden of air transport on government,
- Establish and enforce standards and provide services in a reliable and efficient manner,
- Establish regulations to maintain safety; provide customer choice and reduce environmental impacts while contributing to the social and economic development of

the country and the region.

VI. Pipeline Transportation

- Provide an enabling environment for transportation of fluids and gas through pipelines,
- Improve the services of the mode as an economic alternative to other transport modes, and
- Ensure that pipeline transportation is well-managed, viable, efficient, safe, secure and sustainable with a focus on increasing its share of distribution through removal of bottlenecks, reduction in transport costs, and facilitation of supply chain development and management.

VII. Water Transport on Rivers and Canals

- Providing alternative to trucking and rail and for passenger (tourism) transport in the interior of the country.
- Promoting efficiency and reducing costs and environmental impacts.

VIII. Transport Logistics and Customs

- To enhance trade with a focus on a greater market share of exports through removal of bottlenecks,
- To reduce transport costs, and facilitate supply chain operations.

IX. Urban Transport

To optimize management and use of the road network, in order to improve accessibility, affordability, reliability, and safety of the public in urban areas.

X. Inter-modal Transfers

To maximize use of terminals and minimize modal transfer penalties, in order to strengthen connectivity, comfort and effectiveness for passengers and freight. Also to ensure the efficient linkage and coordination among all the parts and facets of the transportation process, including information exchange.

XI. Legal Aspects

To reduce the cost of transportation and increased traffic and trade and maximizing the benefits to society in general through supporting regulations and developing and harmonizing the implementation structures.

Above objectives of NTP have been evaluated against the SEA objectives to find whether they are compatible (√), neutral (0), or in possible conflict (x) with the SEA objectives. Following table (4.7) shows this compatibility evaluation between the NTP and SEA Objectives.

Table 4.8: Compatibility assessment of NTP objectives against SEA objectives

Policy areas / SEA objectives	Road infrastructure	Road services	Railway Sector	Ports and Shipping Sector	Airport and Aviation Sector	Pipeline Transportation	Inland Water Transport	Transport Logistics and Customs	Urban Transport	Inter-modal Transfers	Legal Aspects
Improve accessibility to vital services and facilities for those without a car and to reduce community severance.	√/x	0	√/x	0	√	0/x	√	0	√/x	√	√
Enhance employment opportunities and expand prospects for sustainable economic development.	0	√	√	√	√	√	√	√	√	√	√
Improve transport safety (reduce casualties) and security (crime and the fear of crime).	√/0	√	x	0/x	√	√	√	0/x	√	0	0
Mitigate the impact of noise and light pollution at major urban centre s.	√/x	0	√/x	0/x	0	0	√	x	√	√	0
To maintain and manage accessibility and local character of the landscape and green spaces.	√/x	0	√/x	0	√	0	√/x	0/x	√	√	0

To maintain the conservation status of the historic environment and heritage assets with known cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets where feasible.	√/x	0	√/x	0	√	0	√	0/√	0	√	0
To sustain and enhance biodiversity, the viability of endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	0/x	0	√/x	x	0	0/x	0/x	x	0	0	0/x
To minimize the production of waste, and promote the sustainable use of natural resources, secondary and recycled materials.	0/√	0/x	0/x	0/x	0/x	0	x	x	0/x	0/x	0
To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	√/x	0/x	0/x	x	x	√	√	x	√	√	0/x
Maintain and improve air quality particularly in major cities.	0	0/x	√/x	0/x	0/x	√	√	x	√	√	0/x
Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	0	0	√/x	0	0	√	√	0	√	√	0
To ensure GHG emission level is not exceeding the national and international limits acceptable.	0/x	0/x	√/x	0/x	0/x	√	√	0/x	√	0/√	0/x
Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	X	0	x	0	0	0	√	0/x	0	0	0
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil.	X	0	√/x	0	0	0/x	√/x	0/x	0/x	0	0

Minimize the adverse effects of transport on fresh water quantity and quality of inland, marine and ground water.	0/x	0	√/x	0/x	0	0/x	√/x	0/x	0	0	0
To integrate national transport policy with other Government policies and objectives.	x	0/x	0/x	x	0/x	0/x	√/x	x	0/x	0	0/x

In table above compatibilities between draft NTP and SEA objectives are highlighted as "√". However, neutral compatibility (0) is recorded for a large number of objectives. Typically this is where the particular NTP objective has no (or limited) ability to influence an SEA objective. Coming paragraphs does not provide commentary on all 176 compatibility rankings given in above table (11 NTP Objectives x 16 SEA Objectives). The proceeding text mainly discusses the incompatibility or otherwise of the 11 policy areas.

Policy Area 1: Road Infrastructure

The main focus of this policy area is public accessibility and safety, roads network developments, maintenance and rehabilitation and ex-ante assessment of policies. The policy is expected to have a positive impact on users through accessibility and safety provision. Energy efficiency and negative environmental effects management could also help improving environmental quality.

The road infrastructure policies are not considered to have any direct negative effect on sustainable economic development, accessibility, marine pollution, and the promotion of energy efficiency.

However policies related to accessibility, road networks development and maintenance and provision of funding priorities to these areas are considered to be incompatible with many of the SEA objectives. Improved level of accessibility and road infrastructure development can enhance the problem of community severance, climate change impacts (flooding), emissions, land contamination, waste generation and water quality deterioration. They also can have negative impacts on the characters of landscapes, green spaces, heritage assets and biodiversity habitats. Proposed mitigation measures to these negative impacts are presented in the table of impact assessment below.

Policy area 2: Road services

This policy area emphasizes the implementation of traffic laws and regulations, providing transport services and balancing the cost to profit ratio in the transport services

sector. These policies are compatible with those SEA Objectives related to economic development and safety and security. While some of them could have a few negative impacts on a number of indicators and assigned as "0/x" because at this stage one cannot definitely say they are incompatible or certainly have negative impacts prior to the carrying out of detailed impact assessment process. They are neutral against some of the SEA objectives and assigned as "0" which means they might have some little effects or not at all which will be find out and discussed in detail in the impact assessment portion below.

Policy area 3: Railway sector

The policy main objective about providing environment friendly services in country (urban and rural) and internationally; and two measures about enhancement of rail lines through adjacent countries and investments will be subjected to environmental and other standards are among the measures contemplated in this policy area.

The impact of providing services and rail line enhancement in country and internationally will be positive only if these services can replace/reduce the road transport and vehicles operations, otherwise vice versa; and that's the reason that many of the areas are assigned as "√/x" such as sustainable transport modes, biodiversity, landscape and greenspaces and air emissions and the impacts of air emissions on other environmental aspects (cultural heritage, air quality, soil and water quality and climate change impacts). Also the problems of community severance, noise pollution and safety and security are totally ignored and there are no measures or targets mentioned for its solution or mitigation. However the measure mentioned in the policy area about investments that it will be according to environmental standards does not specifically refer to these problems or other impacts on relevant environmental aspects which make it uncertain. Therefore there is a need to clearly mention the solutions and mitigation measures for problem arising from each of the relevant policy measure. Also policy measure about services provision should be clear that either it will replace/reduce the road transport or not; if not then what will be the targets to solve or mitigate the impacts arising through policy measure on relevant environmental aspect. However the mitigation measures and solution for each environmental problem arising from this policy measure are discussed in detail in the impact assessment process below.

Policy area 4: Ports and Shipping Sector

This specific policy area is committed mainly toward improvement in performance of PNSC through removing discrimination in employee's health and pension services,

monitoring and controlling maritime services and public and private investments control. Such measures have no direct bad effects on environment. However increase in competition of maritime services and private sector participation to operate commercial operations will have some negative effects on biodiversity, GHG emissions level, waste generation, noise pollution and water quality etc. And for that reason many of the areas are assigned as "0/x".

Policy area 5: Airport and Civil Aviation Sector

Encouraging competition and participation in the market place; enhancing trade and tourism operations; reducing financial burden of air transport on government; and cost benefit analysis of new airports and runway investment are among the measures contemplated in this policy area.

The policy area as a whole is compatible or having limited negative effects on some of the environmental aspects. However, encouraging air transport services and trade will have large negative impacts on energy efficiency and consumption level and hence on air quality and GHG emission level. Tourism improvement is also incompatible with waste production which could have negative effects on biodiversity and the quality of land and water sources.

Policy area 6: Pipeline Transportation

This policy area deals mainly with the transportation of fluids and gases through pipelines which is considered an economic alternative to other conventional transportation modes. Transportation through pipelines is largely compatible or having no potential impacts on SEA objectives and indicators. However, new infrastructure development can increase the problems of community severance, soil degradation, and land and water contamination. Therefore due to the lack of commitments and proper measures to handle these problems, these areas became incompatible with pipeline transportation (particularly underground).

Policy area 7: Water Transport on Rivers and Canals

This policy area mainly focuses on encouragement of inland water transport and tourism through it. The policy area as a whole is compatible or having limited negative effects on some of the environmental aspects. However, the development of leisure and tourism can have significant negative effects on biodiversity, landscape characters, waste generation, and land and water sources contamination. Infrastructure development needed for tourism and leisure can also badly affect water and land sources through erosion, compaction and sealing and also through waste generation etc.

Policy area 8: Transport Logistics and Customs

This policy area deals mainly with effective expansion of international trade and tourism in general, and exports in particular, opening the market to competition and facilitation of supply chain operations.

Enhancing the expansion of international trade and tourism can imply potential need of more transport services than usual; the sitting of which can indirectly be incompatible with biodiversity (through tourism and developmental activities), waste generation, energy consumption, air, noise and light pollution. Pollution of air, noise and light can also negatively affect the landscape character and heritage assets while waste generation through tourism activities can also lead to contaminate land and water bodies and for that reason these are assigned as "0/x". The issues to deal with climate change impacts and transport safety and security has also been ignored in these policy areas which are also assigned as "0/x".

As a whole the indirect negative impacts can be reduced through strengthening related measures in the policy areas of transport services of other related modes. While direct negative impacts like on waste generation, climate change impacts and transport safety and security are due to ignoring these issues in this specific policy area. Therefore there is a need to consider these issues and include proper measure and standards in this specific policy area to deal with such issues.

Policy area 9: Urban Transport

The main focus of this policy area is the management of transport system in urban areas mostly through shifting of narrowly defined transport system to use of large buses and other mass transit system, competition among transport service providers and managing fare levels, congestion, road space usage, land use change and traffic circulation patterns. These measures are mostly compatible or having limited effect on SEA objectives. Though the measure about investment in urban roads can create certain problems for land compaction, waste generation, and community severance however, this measure also states that investment will be subjected to cost, social and environmental impact assessment. For that reason these relation are assigned as "0/x" because, there is no exact commitment mentioned toward management of such issues.

Policy area 10: Inter-modal transfers

Coordination and strengthening interface among all transport modes to provide collaborative and effective services for passengers and freight transfer, and attracting more

tourist traffic through extending airline operations are among the measures envisaged in this Policy Area.

The policy area as a whole is compatible or having limited negative effects on some of the environmental aspects. The measures in this policy area that focus on strengthening connectivity among transport modes are largely compatible with the SEA objectives. However the policy measures that focus on tourism improvement could have limited negative effects on waste generation and hence could on biodiversity and land and water contamination.

Policy area 11: Legal Aspects

This policy area mainly deals with supporting necessary regulations while minimizing or eliminating unreciprocated legal constraints for international trade and transport system and liberalizing freight forwarding regulations.

Although this policy area is largely compatible with the SEA objectives or having limited effects on it, but there are certain negative effects on biodiversity, energy consumption and air pollution. Because the policy area will support and improve international trade and transit system which will lead to more energy consumption and hence will cause air pollution and disturbance to biodiversity; and hence these areas are assigned as "0/x'.

4.6. Impact assessment of National Transport policy and proposing recommendations

The assessment of the impact and its significance is based on the probability of the impact occurring, on the severity of the impact, its duration, reversibility, and the certainty of the impact prediction. Below table describes the assessment framework and the symbols used to denote the various types of impacts.

Table 4.9: Impact assessment legends

Impact character	Symbol	Explanation
Probability	VP	Impact very likely to occur
	P	Impact likely to occur
Scale	++	Large positive impact
	+	Positive impact
	0	No impact
	-	Negative impact
	--	Large negative impact
Direct / Indirect	I	Indirect impact
	D	Direct impact
Frequency / duration	LT	Long term
	ST	Short term
Uncertainty	?	Impact uncertain

Based on the methodology and symbol described, each of the policies was assessed against each SEA objective and its indicators. The results are presented in below Table 4.9.

Table 4.10: Impact assessment of National Transport policy and proposing recommendations

Road infrastructure policies

To reduce operating costs, optimize extraction and use of resources and asset management and to improve accessibility and road safety while ensuring management in an accountable manner to ensure that people and organizations experience improved levels of mobility, accessibility, management of negative environmental effects, energy efficiency and social impacts.

Policy measures

- Ensure the provision of appropriate institutional structures,
- A comprehensive, integrated planning system is to be developed and implemented.
- All major construction decisions must be subject to rigorous ex-ante assessment and cost-benefit and alternatives analysis and justified in terms of the evaluated alternatives.
- Infrastructure investment decisions will be based on the analysis of return on investment (ROI) and optimizing the use of the scarce resources.
- Priority of utilization of funding resources for roads expenditures will be on maintenance first, followed by rehabilitation and improvement of existing roads and by-passes where they are justified on capacity or congestion grounds while ensuring an adequate return on investment.
- Rural roads development and improvement should be based on established accessibility indicators (e.g. Minutes' walk to all weather roads), equity criteria, local priorities, and realistic traffic forecast data.
- For monitoring of performance; Government will specify primary performance indicators with respect to strategic objectives.
- Enforcement of Road traffic and transport law on the road network
- The use of more energy efficient and less polluting modes of transport will be promoted. Greater energy awareness will be fostered in both transport planners and users.

SEA objectives	Indicators	Significance		Recommendations
		Symbol	Description	
Improve accessibility to vital services and facilities for those without a car and to reduce community severance.	• Public accessibility by transportation • Distance travelled to work • Mode of travel to work (by cars, public transport, motor/cycle or walk) • Number of employees working from home • %age employment share by transport • Share of transport sector to GDP (profit to cost ratio)	VP ++/- D LT	Although improving accessibility and providing funds for, can have +ive effects on the indicators related to accessibility but is -ive in case of community severance because policy does not commit for this problem handling.	This policy area shall include proper measures and framework with defined timelines and targets to handle the problem of community severance such as; through proper corridors and other connecting facilities
Enhance employment opportunities and expand prospects for sustainable economic development.		VP ++ D LT	Policies about funding priorities, accessibility and ROI will enhance the economy and employment opportunities.	
Improve transport safety	• Number of casualties and accidents	P	Policy areas about the enforcement of traffic	In order to better quantify

(reduce casualties) and security (crime and the fear of crime).	• Increasing number of two wheelers and other accident causing vehicles • Crime and robbery rate	+/? I LT	laws and feasibility studies can have +ive impact however it cannot be quantified or made certain because these policies does not commit to any degree of improvement in safety. Without targets the implementation of the measures cannot be monitored and achievement of policy objectives cannot be measured. Also increasing accessibility will increase the number of two wheelers and can enhance public safety and securities issues; however it is uncertain before proposing plan measures.	the impacts and to ensure that the impact is +ive, the planning process should pinpoint the targets and timelines indicating what safety and security measures are required and by when.
Mitigate the impact of noise and light pollution at major urban centre s.	• Noise pollution in major traffic zones • light pollution, Smog, night blight and haziness • Total area of woodland/extent of tree cover • Area of Greenfield lost and level of damage to green belts and designated landscapes along transport lines • Number of visitors to national parks and open spaces • Street clutters (sign boards and pamphlets etc along road sides) • Transport infrastructure functionality (well-designed transport lines) • Road density in protected and conservation areas • Deterioration of buildings and monuments due to air pollution and vibration. • Number of visitors to cultural sites • % of cultural heritage sites accessible by	P ?/- D LT	As mentioned above the broad objective of this policy area contain the commitment for managing negative environmental impacts and feasibility studies but having no targets and timelines for such measures, which make it uncertain. The main policy area and funding priority options contain accessibility, maintenance, rehabilitation and improvements of roads and having no priority for environmental quality which can have long term direct -ive impacts on certain indicators.	The policies for funding priorities and monitoring performance should include these indicators to be prioritized and monitored on regular basis. And planning process should mention the targets and timelines for such improvements on individual basis. To avoid vibration effect on historical buildings and heritage assets, main road infrastructure for heavy vehicles should not be developed near to these sites.
To maintain and manage accessibility and local character of the landscape and green spaces. To maintain the conservation status of historic environment and		VP -/+/? D LT	The impact is positive in term of accessibility to landscape, open spaces and heritage sites. However it is negative and uncertain in case of the protection for these areas and better road functionality, because these policies does not commit to any degree of improvement in these areas. Without targets the implementation of the	

heritage assets with known cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets where feasible.	public transport • % of GNP derived from heritage tourism • Number of people employed in heritage, museums and conservation services		measures cannot be monitored and achievement of policy objectives cannot be measured.	
To sustain and enhance biodiversity, the viability of endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• % cover, area and condition of protected areas and forests • Level of damage to green belts along roads • Status of BAP recognized threatened ecosystems and species • Habitat fragmentation • Acidification and eutrophication in water bodies and their impacts on oceanic biodiversity	VP --/? D LT	Policies like accessibility, maintenance, rehabilitation and improvement of roads and funding priorities only for these policies have direct –ive impact on the objective and indicators mentioned. Also Policy measure about environmental conservation has no direct targets and measures for biodiversity protection, which made it uncertain.	As above Also as for as possible, avoid/reduce unnecessary infrastructure in vulnerable areas and even if it was necessary then make proper corridors for wildlife and other animals to pass.
To minimize the production of waste, and promote the sustainable use of natural resources, secondary and recycled materials. To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	• Total annual volume of waste generated. • Proportion of waste recycled/disposed • Increase in the Energy consumption • Consumption of renewable energy by transportation • Quantity of electricity generated from renewable sources • Proportion (%) of electricity generated from renewable sources • Renewable Energy Potential (by type)	P ?/-- D LT	Broad objective of this policy area contain optimization of resource use, however it does not set any proper policy measure or targets for waste reduction and disposal which made it uncertain. Also policy does not contain any commitment or target towards renewable energy use and energy efficiency. The policies for accessibility and funding priorities given to road maintenance, rehabilitation and improvements only, has large negative impacts and will enhance energy consumption and waste generation rate.	Transport policy should include measure for reducing waste production and promoting renewable energy use
Maintain and improve air quality particularly in major	• Increase in the level of PM • levels of key air pollutants (SO_2, Nox, N_2O,	P -/+	As mentioned above that the policies about road networks development and accessibility etc and	This will be dealt in the section of urban policies

cities. Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	NO_2) • Migration rate to urban centres • Population growth rate in urban agglomerations. • % of %age of Population exposed to levels of PM • Increasing level of rickshaws and two wheelers • Increase in the number of private motorcars	D LT	ignoring the environment in funding priorities will lead to increase the problem of PM and migration rate. However in the policy measure of environmental conservation, the promotion of more energy efficient and less polluting modes of transport will have +ive impact on improving sustainable transport modes.	
To ensure GHG emission level is not exceeding the national and international limits acceptable. Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Increase in the Energy consumption • Increase in GHG level • Temperature rise in Pakistan • Increase in the intensity and severity of floods • Annual cost of flooding (to insurers, to authority) • Monsoon contingency plans prepared • % of land with impermeable/ sealed/ compacted surface with transport infrastructure	VP -- D LT	The large –ive impact on these indicators is due to the policies about master plan for roads networks development, maintenance and rehabilitation and economic growth etc. This policy area does not contain any flood management or GHG reduction related measures.	Measures about renewable energy use and flood mitigation and adaptation should be included in the policy. E.g. up to some extent problem can be handled through using of porous materials for rainwater seepage and proper corridors development for water ways during transport infrastructure development.
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil. Minimize the adverse effects of transport on fresh water quantity and quality	• Area of proposed new development on Greenfield sites • Area of soil lost to impermeable/compacted and sealed surfaces • Soil degradation and loss of topsoil • Land contamination • Excess of nitrogen, ammonia and acid critical loads	VP ?/-- D LT	The impact on soil and water resources is potentially negative through the establishment of new infrastructure. There is also a degree of uncertainty found in case of development on Greenfield sites because it will be anticipation before the development of master plan.	As above

of inland, marine and ground water.	• Unsustainable transport infrastructure development. • Decrease in Per capita water availability • Decreasing quantity of fresh water sources • Deteriorating quality of water sources			
To integrate National Transport Policy with other Government policies and objectives	Relevant objectives of • National Environmental Policy, 2005 • NSDS, 2012 • National Climate Change Policy, 2012 • National Drinking Water Policy, 2009 • PEPA, 1997 • Disaster Risk Reduction Policy, 2013 • National Conservation Strategy, 1991 • Biodiversity Action Plan Pakistan, 1999	VP -- I LT	Policy area does not specify any objective for integration of such PPPSAI's requirements and many of the relevant objectives in these PPPSAIs are in conflict with this policy area of road infrastructure development.	In order to be compatible with other relevant government objectives and commitments, this specific policy area should consider the relevant objectives of these PPPSAIs.
Road services Promoting safety, security and service provision and; Reducing transport service costs and environmental impacts. **Policy measures** • Incentives offered to trucking industry must positively contribute to the development of targeted groups and areas. • Axle and gross loads certification, training and licensing regulations of the trucking industry and other modes are to be strictly enforced. • An effective road traffic management system is to be established to promote the enforcement of Road traffic laws, Safety, security, energy utilization and environmental regulations by means of proper, regular vehicle and driver testing and inspection, and training requirements (applied to all vehicle categories), specifically for truckers. • Ensure effective road transport law enforcement and management of cross-border routes and traffic to further ensure compliance with legislation and the promotion of equitable competition in road transport. • Impose strict Government regulations to control the transportation of hazardous materials and substances on roads. Measures will be in place to deal with such materials effectively if and when they are encountered. • Import restrictions on used trucks will be relaxed, so as to encourage use of more multi-axle trucks on long distance hauls. • Road check-posts will be minimized and most existing check points abolished. • The net balance of related income should be reinvested in the transport system. • To encourage private sector participation, and ensure a competitive environment in service provision by providing same regulatory environment to all operators. • No administrative constraints related to carriage of freight under bond, operation of bonded warehouses, and ownership of dry ports shall be exercised.				

• Rural and interurban bus services fares shall be deregulated. • Inter-urban bus services and accompanying infrastructure shall be provided with due regard to safety, comfort and basic care. • Transport agencies shall consider women's and special person's needs in the provision of transport services. • Education and training facilities must be established to promote human resource development in the transport sector.				
SEA objectives	**indicators**	**Significance**		**Recommendations**
		Symbol	**Description**	
Improve accessibility to vital services and facilities for those without a car and to reduce community severance. Enhance employment opportunities and expand prospects for sustainable economic development.	• Public accessibility by transportation • Distance travelled to work • Mode of travel to work (by cars, public transport, motor/cycle or walk) • % of transport lines with proper corridors for communities (severance reduction) • %age employment share by transport • Share of transport sector to GDP (profit to cost ratio)	P + I/D LT	Policies like road check posts minimization and abolishment, and encouragement of private sector participation for service provision could have an indirect positive impact on travel time minimization and accessibility improvement. There is also direct positive impact on GDP and employment share increment.	Policy should also consider measures for provision of services to employees, students and to other facilities.
Improve transport safety (reduce casualties) and security (crime and the fear of crime).	• Number of casualties and accidents • Increasing number of two wheelers and other accident causing vehicles • Crime and robbery rate	VP ++ D LT	Some of the Policies promotes the enforcement of safety and security regulations and is therefore, largely compatible with this SEA Objective.	N/A
Mitigate the impact of noise and light pollution at major urban centre s. To maintain and manage accessibility and local character of the landscape and green spaces. To maintain the conservation status of historic environment and heritage assets with known cultural/ archaeological remains, and encourage ecotourism and	• Noise pollution in major traffic zones • light pollution, Smog, night blight and haziness • Total area of woodland/extent of tree cover • Area of Greenfield lost and level of damage to green belts and designated landscapes along transport lines • Number of visitors to national parks and open spaces • Street clutters (sign boards and pamphlets etc. along road sides)	P - I LT	While policies mainly deal with regulations enforcement and cost benefit adjustments. It is unlikely to be a direct effect on many of the indicators. However, removing restrictions on the import of used trucks and bus services provision policies can augment the problem of air pollution and vibration which in turn can affect the infrastructure of historical buildings and heritage assets.	Running used trucks should be banned, whereas new technology and energy efficiency based trucks and buses use should be promoted. However

accessibility of heritage assets where feasible.	• Transport infrastructure functionality (well-designed transport lines) • Road density in protected and conservation areas • Deterioration of buildings and monuments due to air pollution and vibration. • Number of visitors to cultural sites • % of cultural heritage sites accessible by public transport • % of GNP derived from heritage tourism • Number of people employed in heritage, museums and conservation services			due to vibration effect they should not run near to cultural/ archaeological sites. Renewable energy use should be promoted.
To sustain and enhance biodiversity, the viability of endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• % cover, area and condition of protected areas and forests • Level of damage to green belts along roads • Status of BAP recognized threatened ecosystems and species • Habitat fragmentation • Acidification and eutrophication in water bodies and their impacts on oceanic biodiversity	P - I LT	As mentioned above used and inefficient trucks and bus services can have impact on air pollution and vibration which can indirectly increase the problem of Acidification and eutrophication in water bodies and their impacts on local biodiversity	As above
To minimize the production of waste, and promote the sustainable use of natural resources, secondary and recycled materials. To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	• Total annual volume of waste generated. • Proportion of waste recycled/disposed • Increase in the Energy consumption • Consumption of renewable energy by transportation • Quantity of electricity generated from renewable sources • Proportion (%) of electricity generated from renewable sources	VP - D LT	Paper and Non-renewable materials can be used to publicize and implement the laws, regulations and pricing mechanisms. Traffic calming measures also need resources. Some infrastructure and office materials would also be required which would use resources and can contribute to waste generation. Running Used multi axle trucks and providing bus service could be inefficient in energy	Material used would need to be on recycled paper and electronic means as far as possible. Any traffic calming or pricing mechanisms would use raw materials.

	• Renewable Energy Potential (by type)		consumption and will require more fuel, while there is no commitment towards energy efficiency and use of renewable energy in such policies.	Recommendation is that they should use recycled material wherever possible. Use of renewable sources and energy efficient services should be promoted.
Maintain and improve air quality particularly in major cities. Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	• Increase in the level of PM • levels of key air pollutants (SO_2, Nox, N_2O, NO_2) • Migration rate to urban centre s • Population growth rate in urban agglomerations. • % of %age of Population exposed to levels of PM • Increasing level of rickshaws and two wheelers • Increase in the number of private motorcars	P -/? D LT	As mentioned above used trucks are inefficient in energy consumption and will lead to high emission level. The impacts of Policies regarding encouragement of private sector participation and Providing transport services are uncertain and lacking the commitment for the provision of efficient services and usage of environment-friendly modes like decrease in two wheelers, rickshaws and private cars.	Inefficient service provision by Used trucks, two wheelers, rickshaws and private car ownership should be discouraged while provision of energy efficient modes likes mass transit systems and use of renewable energy should be encouraged.
To ensure GHG emission level is not exceeding the national and international limits acceptable. Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Increase in the Energy consumption • Increase in GHG level • Temperature rise in Pakistan • Increase in the intensity and severity of floods • Annual cost of flooding (to insurers, to authority) • Monsoon contingency plans prepared • % of land with impermeable/ sealed/ compacted surface with transport infrastructure	P -/? D LT	Energy consumption will be increased due to transport services provision and especially usage of used trucks, which can lead to high emission rate. While the policy about energy utilization and environmental regulations is only concerned by means of proper, regular vehicle and driver testing and inspection, and training requirements (applied to all vehicle categories), specifically for truckers, which make it uncertain because there are no	Amend policies so that they contain measurable targets with clear timeframes for usage of energy efficient transport modes and renewable energy sources.

			commitments or targets sit for other modes and energy efficiency.	
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil. Minimize the adverse effects of transport on fresh water quantity and quality of inland, marine and ground water.	• Area of proposed new development on Greenfield sites • Area of soil lost to impermeable/compacted and sealed surfaces • Soil degradation and loss of topsoil • Land contamination • Excess of nitrogen, ammonia and acid critical loads • Unsustainable transport infrastructure development. • Decrease in Per capita water availability • Decreasing quantity of fresh water sources • Deteriorating quality of water sources	P - D LT	Due to used truck services and other transport services without any clear commitment towards usage of energy efficient transport modes and renewable energy in transport services, the emission of N, NH_3 and other acidic gases can take place, which can lead to land and water quality contamination.	As above
To integrate National Transport Policy with other Government policies and objectives.	Relevant objectives of • National Environmental Policy, 2005 • NSDS, 2012 • National Climate Change Policy, 2012 • National Drinking Water Policy, 2009 • PEPA, 1997 • Disaster Risk Reduction Policy, 2013 • National Conservation Strategy, 1991 • Biodiversity Action Plan Pakistan, 1999	VP - D LT	Policy area lacks the commitment towards integration and fulfilling the most of the requirements of these PPPSAIs, whereas most of the policy areas are in clear conflict with such requirements.	In order to produce synergy and reduce inconsistency, Transport services policy should take into consideration the relevant requirements of these policies and objectives.
Railway sector To revitalize rail services on commercial principles, such as cost recovery and financial viability, improve reliability and performance, and enhance the rail services offered for both passengers and freight haulage in support of in-country and international trade. The promotion of an efficient and effective, coordinated, integrated, affordable, safe, reliable and environmentally friendly land passenger transport system in urban and rural areas, accountably managed to ensure that people and freight experience improved levels of mobility and accessibility. **Policy measures**				

• Pakistan Railways (PR) shall be a cost effective and efficient ensurer of quality and reliable service to its customers.
• PR shall operate along commercial lines of business.
• PR shall, separate core and non-core activities with a plan to divest business activities not directly related to operating train services.
• Government shall compensate operators' provision of required loss-making services meeting any social obligations on the basis of the service provided and economic opportunity costs criteria.
• Private sector participation in freight services shall be encouraged.
• Investment in new rail lines shall follow appropriate evaluation mechanisms and be approved on the basis of economic, financial, social and environmental standards.
• Replacement and renewal of rolling stock and other assets shall be a continuous process, rather than the introduction of large replacement stocks at one time.
• Implement proper regulations to minimize the chances of accidents with better control over the transportation of hazardous materials and substances.
• The establishment, operation and maintenance of a land freight transport information system will be developed.
• The establishment of official consultative forums.
• The Pakistan Railway will own the rail infrastructure, rolling stock and land associated with rail reserves. Steps will be taken to utilize rail reserves in accordance with and to help provide resources to achieve transport plans and special development frameworks.
• Operating and maintenance concessions will be awarded by the transport authorities at the provincial or local level in a transparent and equitable manner.
• The current deficit financing system is to be abolished and replaced with a concession system, setting up franchise like agreements with agents other than Pakistan Railways.
• The principle of equity is to be applied in rail tariffs to ensure that no rail route or region benefits above another.
• Enhancement of the connections to rail systems in adjacent countries as a transport hub in South, Southeast and Central Asia.

SEA Objectives	Indicators	Significance		Recommendations
		Symbol	Description	
Improve accessibility to vital services and facilities for those without a car and to reduce community severance. Enhance employment opportunities and expand prospects for sustainable economic development.	• Public accessibility by transportation • Distance travelled to work • Mode of travel to work (by cars, public transport, motor/cycle or walk) • % of transport lines with proper corridors for communities (severance reduction) • %age employment share by transport • Share of transport sector to GDP (profit to cost ratio)	VP ++/- D LT	Although many of the policy areas haven't any impact on these indicators, but improving accessibility and providing services, can have +ive effects on the indicators related to accessibility, economic development and employment, however the impact of enhancing connections to adjacent countries and inside the country can create the problem of community severance and policy area haven't any commitment or target to handle this	In order to handle this problem the policy should contain targets and timeline for reducing community severance by proper corridors and avoiding unnecessary infrastructure in vulnerable areas.

			problem.	
Improve transport safety (reduce casualties) and security (crime and the fear of crime).	• Number of casualties and accidents • Increasing number of two wheelers and other accident causing vehicles • Crime and robbery rate	VP -- D LT	Undoubtedly, railway lines are involved in safety and security issues related to human and animal life as well, but the policy do not addresses this problem in any case and is lacking in the commitment or any target towards these issues handling.	Policy area should address these issues through sitting targets and timelines for problem reduction.
Mitigate the impact of noise and light pollution at major urban centres. To maintain and manage accessibility and local character of the landscape and green spaces. To maintain the conservation status of historic environment and heritage assets with known cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets where feasible.	• Noise pollution in major traffic zones • light pollution, Smog, night blight and haziness • Total area of woodland/extent of tree cover • Area of Greenfield lost and level of damage to green belts and designated landscapes along transport lines• Number of visitors to national parks and open spaces • Street clutters (sign boards and pamphlets etc. along road sides) • Transport infrastructure functionality (well-designed transport lines) • Road density in protected and conservation areas • Deterioration of buildings and monuments due to air pollution and vibration. • Number of visitors to cultural sites • % of cultural heritage sites accessible by public transport • % of GNP derived from heritage tourism • Number of people employed in heritage, museums and conservation services	VP --/? D LT	Although Policy have a commitment that investment in rail lines must be subjected to appropriate evaluation mechanisms on the basis of economic, financial, social and environmental standards, but commitment is lacking towards noise and vibration reduction or protection of biodiversity (fauna and flora), cultural heritage and landscapes, which can directly be affected by railway developmental frameworks and service provision.	Amend relevant policy measures so that they contain measurable targets with clear timeframes for such issues handling.
To sustain and enhance biodiversity, the viability of	• % cover, area and condition of protected areas and forests	VP --/?	Although Policy have a commitment that investment in rail lines must be subjected to	As above

endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• Level of damage to green belts along roads • Status of BAP recognized threatened ecosystems and species • Habitat fragmentation • Acidification and eutrophication in water bodies and their impacts on oceanic biodiversity	D LT	appropriate evaluation mechanisms on the basis of economic, financial, social and environmental standards, but commitment is lacking toward the protection of these indicators and objective, which can directly be affected by railway developmental frameworks and service provision.	
To minimize the production of waste, and promote the sustainable use of natural resources, secondary and recycled materials. To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	• Total annual volume of waste generated. • Proportion of waste recycled/disposed • Increase in the Energy consumption • Consumption of renewable energy by transportation • Quantity of electricity generated from renewable sources • Proportion (%) of electricity generated from renewable sources • Renewable Energy Potential (by type)	VP -/? D LT	Replacement and renewal of rolling stocks can create the problem of waste generation, while increased service level will lead to high energy consumption, however policy doesn't address such issues in relevant developmental measures.	Policy should include the measures and targets, to introduce the culture of using secondary and recycled materials, energy efficiency and the use of renewable energy sources.
Maintain and improve air quality particularly in major cities. Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	• Increase in the level of PM • levels of key air pollutants (SO_2, Nox, N_2O, NO_2) • Migration rate to urban centres • Population growth rate in urban agglomerations. • % of %age of Population exposed to levels of PM • Increasing level of rickshaws and two wheelers • Increase in the number of private motorcars	P +/? D LT	Broad objective of the policy area such as; enhancing rail services for both passengers and freight haulage in country and internationally can reduce dependency on trucks and buses which are responsible for high emissions than rail transport. And providing land passenger transport system in urban and rural areas by rail transport can reduce dependency on personal cars two wheelers, rickshaws and other vehicles responsible for PM and other emissions. Also rail connections enhancement to adjacent countries can reduce/replace the existing road	To achieve the main objective, Policy area should include further measures and targets and timelines with relevant environmental aspects mentioned. Commitment should also contain that these rail services will replace/reduce the existing road transport

			transport system which is more responsible for emissions than rail services. However that objective and measure did not mention such commitments that it will replace/reduce road transport and also there are no targets or further measures recommended to achieve the main objective which make it uncertain.	system.
To ensure GHG emission level is not exceeding the national and international limits acceptable. Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Increase in the Energy consumption • Increase in GHG level • Temperature rise in Pakistan • Increase in the intensity and severity of floods • Annual cost of flooding (to insurers, to authority) • Monsoon contingency plans prepared • % of land with impermeable/ sealed/ compacted surface with transport infrastructure	P +/? D LT	As mentioned above that if providing rail services in urban, rural areas and through adjacent countries can replace/reduce the road transport especially for freight, then it will have positive impact otherwise it will augment the problem of emissions and energy consumption and ultimately for climate change impacts like floods etc. However, policy area commits that investment in new rail lines shall follow appropriate evaluation mechanisms and be approved on the basis of economic, financial, social and environmental standards but it didn't mentioned any targets or recommendations for specific problems which will arise through development of rail lines and other infrastructure.	As above and, Energy consumption should be efficient and try to use renewable energy in rail services. And the objective of rail lines development should include the mitigation and adoption measures to climate change impacts, like develop water ways on specific places to pass the rain water and floods.
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil.	• Area of proposed new development on Greenfield sites • Area of soil lost to impermeable/compacted and sealed surfaces • Soil degradation and loss of topsoil	P -/? D/I LT	Rail stations and lines infrastructure can lead to soil sealing, degradation and compaction and loss of top soil and Greenfield sites. Rail services if not replacing or minimizing road services, can have an indirect negative	Policy should commit for use of renewable and efficient sources of energy in rail services.

Minimize the adverse effects of transport on fresh water quantity and quality of inland, marine and ground water.	• Land contamination • Excess of nitrogen, ammonia and acid critical loads • Unsustainable transport infrastructure development. • Decrease in Per capita water availability • Decreasing quantity of fresh water sources • Deteriorating quality of water sources		impact on water quality due to augmentation in the problem of N, NH_3 and acidic critical loads. Measure about "Investments will follow environmental standards" has not included any direct target or measure for such problems which make it uncertain.	Porous materials should be used in infrastructure for rainwater seepage.
To integrate National Transport Policy with other Government policies and objectives	Relevant objectives of • National Environmental Policy, 2005 • NSDS, 2012 • National Climate Change Policy, 2012 • National Drinking Water Policy, 2009 • PEPA, 1997 • Disaster Risk Reduction Policy, 2013 • National Conservation Strategy, 1991 • Biodiversity Action Plan Pakistan, 1999	VP - D LT	This policy area ignores and didn't mention many of the relevant objectives of these PPPSAIs, which can produce inconsistencies between NTP and these PPPSAIs.	In order to produce synergy and reduce inconsistencies; This specific policy area should integrate the relevant objectives and standards mentioned in these PPPSAIs.

Ports and Shipping Sector: Improving efficiency, reducing shipping and port costs, and facilitating trade through improving affordability and reliability for shippers and therefore, end-users.

Policy measures

- Port ownership shall be on a landlord basis with strong encouragement of the private sector to operate commercial operations. Port services will be corporatized under the landlord frame of operation and port organization.
- Update an integrated port master plan. (*It will be subjected to separate assessment process*).
- Monitor port charges and reduce where excessive levels are found compared to revenues and profit levels of other regional ports in South Asia.
- Public sector investment shall be subjected to rigorous technical and economic feasibility study and alternatives analysis.
- Discriminatory labor practices will be removed and terms of employment of port labor will ensure access to health and pension services.
- Control over maritime services will be maintained within a well-defined regulatory framework that is flexible enough to cater to changing needs and circumstances and at the same time able to ensure orderly, safe and reliable maritime transport services.
- International relations and trade facilitating agreements in maritime activities shall be promoted.
- Pakistan National Shipping Company (PNSC) will compete with foreign and domestic shipping lines on a level playing field.

• Interdepartmental and private initiatives should be promoted to ensure that administrative, fiscal and legal constraints to the development of the country register and its ancillary services are removed.				
SEA objectives	**Indicators**	**Significance**		**Recommendations**
		Symbol	**Description**	
Improve accessibility to vital services and facilities and to reduce community severance.	• Public accessibility by transportation. • Distance travelled to work • Mode of travel to work • % of transport lines with proper corridors for communities (severance reduction)	0	Emphasis of ports and shipping sector of Pakistan is on freight transport development and there are no objectives provided for passenger transport. Therefore the impact cannot be certainly quantified.	N/A
Enhance employment opportunities and expand prospects for sustainable economic development.	• %age employment share by transport • Share of transport sector to GDP (profit to cost ratio)	VP ++ D LT	Most of the policy objectives are in favor to enhance the economic development and employees rights and opportunities.	
Improve transport safety (reduce casualties) and security (crime and the fear of crime).	• Number of casualties and accidents • Increasing number of two wheelers and other accident causing vehicles • Crime and robbery rate	P - D ST	There is no objective mention for safety or security. And obviously this problem is attached with transportation of goods and providing other services in ports and shipping sector.	Policy area should include measures with clear targets and timelines for safety and security.
Mitigate the impact of noise and light pollution at major urban centres.	• Noise pollution in major traffic zones • light pollution, Smog, night blight and haziness • Total area of woodland/extent of tree cover • Area of Greenfield lost and level of damage to green belts and designated landscapes along transport lines • Number of visitors to national parks and open spaces • Street clutters (sign boards and pamphlets etc along road sides) • Transport infrastructure functionality • Road density in protected and conservation	P - D LT	Noise pollution will increase through increasing competition which can have severe effects on marine mammals, turtles and other vertebrates while this policy area does not include any such measure to address this issue.	This policy area should take a precautionary approach to noise regulation.
To maintain and manage accessibility and local character of the landscape and green spaces.		0	Ports and shipping transport system is exempted from such effects because it has no direct proper dealing with valuable landscapes or green spaces.	N/A
To maintain the conservation status of historic environment and heritage assets with known		P 0/- I	Improved competition in the ports and shipping services has no direct impact on cultural heritage as no new structures are	During increase in services provision, reduce dependency on

cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets where feasible.	areas • Deterioration of buildings and monuments due to air pollution and vibration. • Number of visitors to cultural sites • % of cultural heritage sites accessible by public transport • % of GNP derived from heritage tourism • Number of people employed in heritage, museums and conservation services	LT	proposed. However, there may be a negative indirect impact if emissions increased through increase in energy consumption, which can cause acid rain and that can attack historic buildings and monuments.	fossil fuel consumption and produce a culture of energy efficiency and consumption of renewable energy sources as far as possible.
To sustain and enhance biodiversity, the viability of endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• % cover, area and condition of protected areas and forests • Level of damage to green belts along roads • Status of BAP recognized threatened ecosystems and species • Habitat fragmentation • Acidification and eutrophication in water bodies and their impacts on oceanic biodiversity	VP - D/I ST	Increase maritime services can have direct significant effects on oceanic biodiversity and indirect through increase in noise and waste generation however there is no objective or target mentioned for its protection or conservation. Increase in acidification have also an indirect effect on oceanic biodiversity as discussed above, while there is no proper measure mentioned in this policy area to control this problem.	This specific policy area should include proper measures and should provide a proper framework for biodiversity protection and conservation.
To minimize the production of waste, and promote the sustainable use of natural resources, secondary and recycled materials. To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	• Total annual volume of waste generated. • Proportion of waste recycled/disposed • Increase in the Energy consumption • Consumption of renewable energy by transportation • Quantity of electricity generated from renewable sources • Proportion (%) of electricity generated from renewable sources • Renewable Energy Potential (by type)	VP -- D LT	Waste generation capacity will also increase due to increasing maritime services while there is no proper objective mentioned to deal with waste generation or transportation of hazardous wastes etc. Energy consumption will be increased through producing competition, investments and providing services however there is no objective for reduction in energy consumption or energy efficiency or use of renewable energy in ports and shipping sector which will	As above

			lead to bad effects.	
Maintain and improve air quality particularly in major cities.	• Increase in the level of PM • levels of key air pollutants (SO_2, NOx, N_2O, NO_2) • Migration rate to urban centres • Population growth rate in urban agglomerations.	P 0/- I LT	Although Improved competition in the ports and shipping services has no direct impact on air quality in urban centre s. However, there may be a negative indirect impact if emissions increased through increase in energy consumption, as air has no boundaries.	As above
Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	• % of %age of Population exposed to levels of PM • Increasing level of rickshaws and two wheelers • Increase in the number of private motorcars	0	Ports and shipping policy objectives has no quantified impact on this SEA objective or its relevant indicators.	N/A
To ensure GHG emission level is not exceeding the national and international limits acceptable. Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Increase in the Energy consumption • Increase in GHG level • Temperature rise in Pakistan • Increase in the intensity and severity of floods • Annual cost of flooding (to insurers, to authority) • Monsoon contingency plans prepared • % of land with impermeable/ sealed/ compacted surface with transport infrastructure	P - D LT	Energy consumption will be increased through producing competition, investments and providing services which will contribute to the level of GHG emissions and temperature rise.	During increase in services provision, reduce dependency on fossil fuel consumption and produce a culture of energy efficiency and consumption of renewable energy sources as far as possible.
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil. Minimize the adverse effects of transport on fresh water quantity and quality of inland, marine	• Area of proposed new development on Greenfield sites • Area of soil lost to impermeable/compacted and sealed surfaces • Soil degradation and loss of topsoil • Land contamination • Excess of nitrogen, ammonia and acid critical loads	P - D LT	Increasing commercial operations and competiveness in maritime activities will generate problems of land contamination and water pollution e.g. through enhancing acidification, oil leakage from a ship etc.	This policy area should also include the precautionary measure and mitigation framework with the relevant measures that are creating the problem.

and ground water.	• Unsustainable transport infrastructure development. • Decrease in Per capita water availability • Decreasing quantity of fresh water sources • Deteriorating quality of water sources			
To integrate National Transport Policy with other Government policies and objectives	Relevant objectives of • National Environmental Policy, 2005 • NSDS, 2012 • National Climate Change Policy, 2012 • National Drinking Water Policy, 2009 • PEPA, 1997 • Disaster Risk Reduction Policy, 2013 • National Conservation Strategy, 1991 • Biodiversity Action Plan Pakistan, 1999	VP -- D LT	This policy area totally ignores the protection and conservation of relevant environmental aspects and have no proper objective or targets, which can lead to inconsistency with the objectives of these PPPSAIs mentioned in table 4.1 above.	This specific policy area should consider the relevant environmental aspects affected and should integrate the relevant objectives of these PPPSAIs in their relevant measures.

Airport and Civil Aviation Sector

- The Civil Aviation Authority (CAA) shall focus on its core activities (i.e. safety regulation and air traffic control - ATC).
- Airport management shall be separated from CAA with the eventual objective of privatization.
- Scheduled international air transport services to and from Pakistan should at all times comply with the minimum international norms and standards pertaining to aviation safety and security.
- Any regulatory measure pertaining to the economic aspects of scheduled international air transport services will be based on encouraging competition and our participation in the market place; and safeguarding national interests, where necessary.
- Regulatory controls on capacity and frequency should enable airlines to unilaterally adjust their services to satisfy the demand, within a framework of lower and upper limits.
- Tariffs should be generally deregulated to allow airlines the freedom to set tariffs in response to demand.
- International air transport services should stimulate tourism to Pakistan; develop new air links and joint ventures; and stimulate trade in general and exports in particular.
- PIA needs to be restructured along commercial lines, with a view to privatization in the near future.
- There shall be a concerted movement towards economic deregulation of domestic and international passenger and cargo services.
- Requirements for new entrants in the existing policy should be strengthened and it should be assessed with regard to their ability to provide a safe and reliable service, from a financial point of view.
- The participation of State-owned airlines in a deregulated domestic market needs further consideration, review and resolution.

• There shall be free market entry for private operators to domestic routes subject to compliance with technical and financial capacity requirements and strict safety regulation and enforcement. • Continue to adjust policies and procedures to meet guidelines of the International Civil Aviation Organization (ICAO). • Airport charges shall be in line with regional benchmarks. • Operation of non-viable airports shall be reviewed by considering private sector management, management by local governments or possible closure. • New airports, especially, new runway investment, shall be subjected to cost-benefit analysis of the effects on all interested parties. • A Working Group of stakeholders for the purpose of assisting the Government with the formulation of policies on airline co-operation, code-sharing and the provision of international non- scheduled air transport services shall be constituted.				
SEA objectives	**Indicators**	**Significance**		**Recommendations**
		Symbol	**Description**	
Improve accessibility to vital services and facilities and to reduce community severance. Enhance employment opportunities and expand prospects for sustainable economic development.	• Public accessibility by transportation. • Distance travelled to work • Mode of travel to work • % of transport lines with proper corridors for communities (severance reduction) • %age employment share by transport • Share of transport sector to GDP (profit to cost ratio)	VP ++ D/I LT	All of the objectives and measures in this policy area directly or indirectly have a positive impact on accessibility and contribute to GPD and employment share by transportation.	N/A
Improve transport safety (reduce casualties) and security (crime and the fear of crime).	• Number of casualties and accidents • Increasing number of two wheelers and other accident causing vehicles • Crime and robbery rate	P + D LT	The impact is considered positive because of the policy measures that main focus of CAA will be on safety regulations and air traffic control. Also new entry for private operators and other entrants in the policy are strictly subjected to safety and security regulations.	The policy should contain targets and timelines indicating what safety and security measures will be required and by when.
Mitigate the impact of noise and light pollution at major urban centres.	• Noise pollution in major traffic zones • light pollution, Smog, night blight and haziness • Total area of woodland/extent of tree cover • Area of Greenfield lost and level of damage to green belts and designated landscapes along transport lines	P - D LT	Many of the policy measures encourage the competition and participation in the market place that can increase the extent and frequency of air transport services which will have bad impact on noise and light pollution. While none of the measures mention this	Include proper measure and framework for such problem handling and new airports should be made away from residential areas.

	• Number of visitors to national parks and open spaces • Street clutters (sign boards and pamphlets etc. along road sides) • Transport infrastructure functionality (well-designed transport lines) • Road density in protected and conservation areas • Deterioration of buildings and monuments due to air pollution and vibration. • Number of visitors to cultural sites • % of cultural heritage sites accessible by public transport • % of GNP derived from heritage tourism • Number of people employed in heritage, museums and conservation services		issue.	
To maintain and manage accessibility and local character of the landscape and green spaces. To maintain the conservation status of historic environment and heritage assets with known cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets where feasible.		P -/+ D LT	New airports and runway investments are only subjected to cost benefit analysis of the impacts on all parties while having no concern to the protection of quality landscape or historic environment and heritage assets. Also increase in air transport services will contribute to air and noise pollution which can lead to deterioration of historic buildings and monuments. The positive impact is due to increase in accessibility and stimulation of tourism in Pakistan which can increase number of visits to cultural sites and open spaces and hence can contribute to GNP and employment share.	New airports and runway investment projects should subject to prior environmental impact assessment. Also new airports and runways should be made away from quality landscapes and cultural and archaeological sites.
To sustain and enhance biodiversity, the viability of endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• % cover, area and condition of protected areas and forests • Level of damage to green belts along roads • Status of BAP recognized threatened ecosystems and species • Habitat fragmentation • Acidification and eutrophication in water bodies and their impacts on oceanic biodiversity	P - D LT	New airports and runway investments are only subjected to cost benefit analysis of the impacts on all parties while having no concern to the protection of biodiversity. Also increase in air transport services will contribute to air emissions and hence acidification of water bodies which will negatively affect oceanic biodiversity.	New airports and runway investment projects should subject to prior biodiversity impact assessment. Also avoid new airports and runways infrastructure development in protected areas and threatened ecosystems.
To minimize the production of waste, and promote the sustainable use of natural resources, secondary and	• Total annual volume of waste generated. • Proportion of waste recycled/disposed • Increase in the Energy consumption • Consumption of renewable energy by	VP -- D LT	The potential negative impact is due to the stimulation of tourism in Pakistan which can enhance the problem of waste production due to tourist's activities. Also new airports and	Policy area should commit toward energy efficiency and encourage the use of

recycled materials. To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	transportation • Quantity of electricity generated from renewable sources • Proportion (%) of electricity generated from renewable sources • Renewable Energy Potential (by type)		runway investments are only subjected to cost benefit analysis of the impacts on all parties while having no concern for waste management or use of recycled and secondary materials. Energy consumption will also be increased due to increase in competition and air transport services while this policy area hasn't any commitment toward use of renewable energy sources in future.	renewable and recycled resources. Also, Policy area should consider the issue of waste generation and CAA should manage this issue in collaboration with waste management department.
Maintain and improve air quality particularly in major cities. Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	• Increase in the level of PM • levels of key air pollutants (SO_2, Nox, N_2O, NO_2) • Migration rate to urban centres • Population growth rate in urban agglomerations. • % of %age of Population exposed to levels of PM • Increasing level of rickshaws and two wheelers • Increase in the number of private motorcars	P - D LT	The negative impact is due to increase in air transport services which can contribute to level of air pollutants emission. Also stimulation of tourism to Pakistan and making of new airports and runways near to urban centres can increase urban population which can increase burden on other transport modes and hence air emissions.	In order to reduce burden on urban population; new airports and runways should be made away from urban areas. Policy area should also commit for energy efficiency and use of renewable energy.
To ensure GHG emission level is not exceeding the national and international limits acceptable. Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Increase in the Energy consumption • Increase in GHG level • Temperature rise in Pakistan • Increase in the intensity and severity of floods • Annual cost of flooding (to insurers, to authority) • Monsoon contingency plans prepared • % of land with impermeable/ sealed/ compacted surface with transport infrastructure	VP - D LT	Many of the policy measures contribute to increase air transport services which will lead to high energy consumption and can contribute to GHG level and hence climate change impacts. Also new airports and runway infrastructure development can create the problem of land surface compaction and impermeability while this policy measure doesn't commit for this problem handling.	Policy area should commit for energy efficiency and use of renewable energy sources. Avoid new airports and runway infrastructure on quality land surface and water bodies and use porous and permeable

				materials.
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil. Minimize the adverse effects of transport on fresh water quantity and quality of inland, marine and ground water.	• Area of proposed new development on Greenfield sites • Area of soil lost to impermeable/compacted and sealed surfaces • Soil degradation and loss of topsoil • Land contamination • Excess of nitrogen, ammonia and acid critical loads • Unsustainable transport infrastructure development. • Decrease in Per capita water availability • Decreasing quantity of fresh water sources • Deteriorating quality of water sources	VP - D/I LT	New airports and runway infrastructure development can create the problem of quality land surface compaction and impermeability and soil degradation while this policy measure doesn't commit for this problem handling. Soil degradation and increase in air emissions due to air transport services can deteriorate water quality through acid critical loads.	As above
To integrate National Transport Policy with other Government policies and objectives	Relevant objectives of • National Environmental Policy, 2005 • NSDS, 2012 • National Climate Change Policy, 2012 • National Drinking Water Policy, 2009 • PEPA, 1997 • Disaster Risk Reduction Policy, 2013 • National Conservation Strategy, 1991 • Biodiversity Action Plan Pakistan, 1999	VP - D LT	As mentioned above, this policy area ignores many of the environmental problems that are mentioned in these PPPSAIs which can lead to inconsistency and can create problems in future. Also this policy area commits that new entrants in the existing policy should only be assessed with regard to their ability to provide a safe and reliable service, from a financial point of view but ignores environmental point of view which can have direct and indirect benefits.	This policy area should consider related environmental aspects mentioned in these PPPSAIs and above mentioned recommendations.
Pipeline Transportation Provide an enabling environment for transportation of fluids and gas through pipelines, improve the services of the mode as an economic alternative to other transport modes, ensure that pipeline transportation is well-managed, viable, efficient, safe, secure and sustainable with a focus on increasing its share of distribution through removal of bottlenecks, reduction in transport costs, and facilitation of supply chain development and management.				

Policy measures

- Review best global practices, develop and improve standards for operations, security, safety and sustainability of supply and ensure efficient, economic and viable methods of fluids and gas transport.
- Improve the service standards and promote pipelines as an economic alternative mode for fuel transportation.
- Develop infrastructure for enhancing the use of pipelines in difficult to access areas and ensure connectivity with other main stream infrastructure.
- Encourage greater private sector participation in sustainable international pipeline services
- Prevent leakages, minimize losses during transmission and ensure safe and timely efficient delivery.
- Develop rules, regulations and standard operating procedures for promoting the operations in the private sector with the responsibilities and liabilities clearly specified and documented.

SEA objectives	Indicators	Significance		Recommendations
		Symbol	Description	
Improve accessibility to vital services and facilities and to reduce community severance.	• Public accessibility by transportation. • Distance travelled to work • Mode of travel to work • % of transport lines with proper corridors for communities (severance reduction)	P +/- D LT	Impact is positive in case of improving public accessibility while it can be negative for community severance because there is no proper measure mentioned to handle this problem effectively.	This specific policy area should include proper measure to handle the problem of community severance.
Enhance employment opportunities and expand prospects for sustainable economic development.	• %age employment share by transport • Share of transport sector to GDP (profit to cost ratio)	VP D ++ LT	Transportation of gas and fluids through pipeline is a good alternative to other modes which are costly due to transportation charges.	
Improve transport safety (reduce casualties) and security (crime and the fear of crime).	• Number of casualties and accidents • Increasing number of two wheelers and other accident causing vehicles • Crime and robbery rate	VP D + LT	This policy area reduces dependency on conventional transportation modes which are highly insecure and unsafe for people than pipeline transportation.	Although measure are mentioned for safety but specific standards and targets should also include to improve safety and security
Mitigate the impact of noise and light pollution at major urban centres.	• Noise pollution in major traffic zones • light pollution, Smog, night blight and haziness • Total area of woodland/extent of tree cover • Area of Greenfield lost and level of damage to	VP ++/-/? D/I LT	Transportation of fluids and gases through pipelines is a good alternative to other transport modes, and hence reduces the problem of noise, light, vibration and air pollution and road	To protect cultural heritage, landscapes and Greenfields sites, policy area should consider

To maintain and manage accessibility and local character of the landscape and green spaces. To maintain the conservation status of historic environment and heritage assets with known cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets where feasible.	green belts and designated landscapes along transport lines • Number of visitors to national parks and open spaces • Street clutters (sign boards and pamphlets etc. along road sides) • Transport infrastructure functionality (well-designed transport lines) • Road density in protected and conservation areas • Deterioration of buildings and monuments due to air pollution and vibration. • Number of visitors to cultural sites • % of cultural heritage sites accessible by public transport • % of GNP derived from heritage tourism • Number of people employed in heritage, museums and conservation services		density which indirectly have a positive impact on landscapes, green spaces and cultural heritage buildings etc. Pipelines if not properly managed, can also have some negative impacts on Greenfields and landscapes and also on geological sites.	proper measures for it such as; Pipelines if necessary; should be underground in valuable landscapes and it should be kept away from cultural and geological sites.
To sustain and enhance biodiversity, the viability of endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• % cover, area and condition of protected areas and forests • Level of damage to green belts along roads • Status of BAP recognized threatened ecosystems and species • Habitat fragmentation • Acidification and eutrophication in water bodies and their impacts on oceanic biodiversity	P ?/- D LT	As mentioned above pipeline transportation if not properly managed, can negatively affect the biodiversity, flora and fauna of the area where it passes through. Also it can create problem of habitat fragmentation and community severance for species.	This problem should be handled through specific measures and standards such as; Proper corridors shall be provided or pipelines should be passes underground in vulnerable areas.
To minimize the production of waste, and promote the sustainable use of natural	• Total annual volume of waste generated. • Proportion of waste recycled/disposed • Increase in the Energy consumption	P 0/+ D	Pipeline transportation haven't any direct impact on waste generation or renewable energy however, it reduces the use of energy	N/A

resources, secondary and recycled materials. To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	• Consumption of renewable energy by transportation • Quantity of electricity generated from renewable sources • Proportion (%) of electricity generated from renewable sources • Renewable Energy Potential (by type)	LT	for transportation of fluids and gases in other transport modes.	
Maintain and improve air quality particularly in major cities. Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	• Increase in the level of PM • levels of key air pollutants (SO_2, NOx, N_2O, NO_2) • Migration rate to urban centres • Population growth rate in urban agglomerations. • %age of Population exposed to levels of PM • Increasing level of rickshaws and two wheelers • Increase in the number of private motorcars	P + I LT	Transportation of fluids and gases through pipelines is a good alternative to other conventional modes of transportation which can alternatively contribute to reduction of air pollution.	
To ensure GHG emission level is not exceeding the national and international limits acceptable. Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Increase in the Energy consumption • Increase in GHG level • Temperature rise in Pakistan • Increase in the intensity and severity of floods • Annual cost of flooding (to insurers, to authority) • Monsoon contingency plans prepared • % of land with impermeable/sealed/ compacted surface with transport infrastructure	P +/- I LT	Pipeline transportation reduces the use of energy for transportation of fluids and gases in other transport modes and can alternatively reduce GHG emission level. There is no proper measure mentioned to handle the problem of floods and other climate change impacts.	Proper measures should be included to protect pipelines from climate change impacts like floods and avoid/ strengthen pipelines transportation in high vulnerable flood zones.
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function	• Area of proposed new development on Greenfield sites • Area of soil lost to impermeable/compacted and sealed surfaces	P - D/I LT	Underground transportation needs digging of land through which topsoil can be lost and land can be contaminated directly which can indirectly contaminate the water bodies as well.	Topsoil should be maintained and the problem of soil degradation and land

of soil. Minimize the adverse effects of transport on fresh water quantity and quality of inland, marine and ground water.	• Soil degradation and loss of topsoil • Land contamination • Excess of nitrogen, ammonia and acid critical loads • Unsustainable transport infrastructure development. • Decrease in Per capita water availability • Decreasing quantity of fresh water sources • Deteriorating quality of water sources			contamination should be handled through proper measures and standards on the spot.
To integrate National Transport Policy with other Government policies and objectives	Relevant objectives of • National Environmental Policy, 2005 • NSDS, 2012 • National Climate Change Policy, 2012 • National Drinking Water Policy, 2009 • PEPA, 1997 • Disaster Risk Reduction Policy, 2013 • National Conservation Strategy, 1991 • Biodiversity Action Plan Pakistan, 1999	P - D LT	This specific policy area does not include any objective for integration of such relevant objectives of environmental protection and conservation.	In order to produce synergy and reduce inconsistency, this specific policy area should consider the relevant aspects of environment mentioned in these PPPSAIs.

Water Transport on Rivers and Canals

To provide an economic bulk and possibly passenger (tourism) transport alternative to trucking and rail in the interior of the country, in cases and circumstances where it is a viable alternative, efficiency will be promoted; costs and environmental impacts will be reduced.

Policy measures

- Water transport options will be explored.
- A code of principles, operating procedures and safety standards shall be created.
- A hazard, emergency and disaster management, and response system (protocol) shall be developed.
- A framework consistent with the above cases of roads, rail, air and pipeline transport to promote and encourage private sector participation and investment shall be developed.
- Requirements for construction of needed infrastructure including a communications infrastructure and related services will be created to support development where feasible.
- Leisure and tourism related development both in terms of water transport and the infrastructure to support it shall be encouraged.

• Close government oversight and monitoring of water transport development shall be undertaken to compare services and fare structure with neighboring countries such as India, Iran and Turkey.				
SEA objectives	**Indicators**	**Significance**		**Recommendations**
		Symbol	**Description**	
Improve accessibility to vital services and facilities and to reduce community severance. Enhance employment opportunities and expand prospects for sustainable economic development.	• Public accessibility by transportation. • Distance travelled to work • Mode of travel to work • % of transport lines with proper corridors for communities (severance reduction) • %age employment share by transport • Share of transport sector to GDP (profit to cost ratio)	VP ++ D LT	Water transport has positive impacts on accessibility as well as community severance reduction. It will also contribute to sustainable economy because it's a good alternative to other energy consuming transport modes.	N/A
Improve transport safety (reduce casualties) and security (crime and the fear of crime).	• Number of casualties and accidents • Increasing number of two wheelers and other accident causing vehicles • Crime and robbery rate	P 0/+ D LT	Water transport however can cause casualties but this policy area includes the measures for safety and to handle with disasters and calamities. Water transport is safe and secure than, and hence a good alternative to other transport modes.	Exact targets and procedures for safety and disaster management should be included.
Mitigate the impact of noise and light pollution at major urban centres.	• Noise pollution in major traffic zones • light pollution, Smog, night blight and haziness • Total area of woodland/extent of tree cover • Area of Greenfield lost and level of damage to green belts and designated landscapes along transport lines	P + D LT	If water transport replaces other conventional transport means of freight and passengers like multi axel trucks, rails and other heavy vehicles, then the severity of noise and light pollution can be reduced.	To further manage noise, standards should be made and included in the measures for vehicles used in water transport.
To maintain and manage accessibility and local character of the landscape and green spaces.	• Number of visitors to national parks and open spaces • Street clutters (sign boards and pamphlets etc along road sides) • Transport infrastructure functionality (well-	P +/-/? D LT	In case of accessibility the impact is positive while establishment of new infrastructure can negatively affect area of woodland and other valuable landscapes. There is a degree of uncertainty because	To avoid tree loss, include the measure for the protection of landscapes and woodlands from

	designed transport lines) • Road density in protected and conservation		these impacts are site specific and sites are not designated in this Policy area.	infrastructure development.
To maintain the conservation status of historic environment and heritage assets with known cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets where feasible.	areas • Deterioration of buildings and monuments due to air pollution and vibration. • Number of visitors to cultural sites • % of cultural heritage sites accessible by public transport • % of GNP derived from heritage tourism • Number of people employed in heritage, museums and conservation services	P + D LT	As an alternative to other heavy vehicles, water transport system is more viable for vibration and air pollution control. Also it has positive impact on accessibility and tourism development to cultural sites.	To further manage vibration and air pollution, standards should be made and included in the measures for vehicles used in water transport.
To sustain and enhance biodiversity, the viability of endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• % cover, area and condition of protected areas and forests • Level of damage to green belts along roads • Status of BAP recognized threatened ecosystems and species • Habitat fragmentation • Acidification and eutrophication in water bodies and their impacts on oceanic biodiversity	VP -/? D LT	The impact on biodiversity is potentially negative through the establishment of new infrastructure and tourism development. There is a degree of uncertainty because these impacts are site specific and sites are not designated in the Policy area.	Potential impacts on biodiversity should be assessed at the planning stage and measure for the protection of biodiversity should be included in this policy area.
To minimize the production of waste, and promote the sustainable use of natural resources, secondary and recycled materials. To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	• Total annual volume of waste generated. • Proportion of waste recycled/disposed • Increase in the Energy consumption • Consumption of renewable energy by transportation • Quantity of electricity generated from renewable sources • Proportion (%) of electricity generated from renewable sources • Renewable Energy Potential (by type)	VP -/+ D LT	Tourism and related infrastructure development can cause generation of waste while there is no commitment made for such negative impact handling. Water transport as an alternative to heavy vehicles like trucks and rails transport can reduce energy consumption but this policy area also lacks in the commitment or any target toward the use of renewable energy.	Ensure good tourism practices, adequate monitoring, proper use of renewable energy sources and other protective measures through the planning and environmental permitting processes
Maintain and improve air quality	• Increase in the level of PM	P	The positive impact is due to the replacement	To further reduce air

particularly in major cities. Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	• levels of key air pollutants (SO_2, Nox, N_2O, NO_2) • Migration rate to urban centres • Population growth rate in urban agglomerations. • %age of Population exposed to levels of PM • Increasing level of rickshaws and two wheelers • Increase in the number of private motorcars	+ D LT	of heavy vehicles transport system by water transport which is less energy consuming and hence will result in lower emissions.	pollution level, vehicles used in water transportation should be standardized and of good quality and technology. Also try to use renewable energy sources.
To ensure GHG emission level is not exceeding the national and international limits acceptable.	• Increase in the Energy consumption • Increase in GHG level • Temperature rise in Pakistan • Increase in the intensity and severity of floods	P + D LT	The positive impact is due to the replacement of heavy vehicles transport system by water transport which is less energy consuming and hence will result in lower the emissions level.	As above
Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Annual cost of flooding (to insurers, to authority) • Monsoon contingency plans prepared • % of land with impermeable/sealed/ compacted surface with transport infrastructure • Area of proposed new development in flood zones	P 0/- D LT	Although there is a measure included for disaster management and response system and safety standards to be made but there is no clear commitment made to deal with the negative impact of new infrastructure development in flood vulnerable areas or reducing land sealing or compaction during development.	The measure on standards should make clearer reference to which design standards the measure is being addressed. Mention of control of new development on flood prone areas and land compaction would strengthen the measure.
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil. Minimize the adverse effects of transport on fresh water quantity	• Area of proposed new development on Greenfield sites • Area of soil lost to impermeable/compacted and sealed surfaces • Soil degradation and loss of topsoil • Land contamination • Excess of nitrogen, ammonia and acid critical	VP - D LT	The impact is negative because new infrastructure development will lead to compaction, sealing, degradation and contamination of new land and bared soil areas. Leisure and tourism related development and activities will lead to waste generation and	The policy area could contain measures that limit the waste generation and direct contamination of water bodies from tourism. Use permeable

and quality of inland, marine and ground water.	loads • Unsustainable transport infrastructure development. • Decrease in Per capita water availability • Decreasing quantity of fresh water sources • Deteriorating quality of water sources		hence direct water contamination and quality deterioration.	materials in infrastructure development and avoid loss of topsoil and its degradation.
To integrate National Transport Policy with other Government policies and objectives	Relevant objectives of • National Environmental Policy, 2005 • NSDS, 2012 • National Climate Change Policy, 2012 • National Drinking Water Policy, 2009 • PEPA, 1997 • Disaster Risk Reduction Policy, 2013 • National Conservation Strategy, 1991 • Biodiversity Action Plan Pakistan, 1999	VP - D LT	This policy area ignores many of the relevant objectives of for example monsoon contingency plan, disaster reduction policy, conservation strategy and environmental policy and others, which leads to inconsistency and tussle among other department's objectives and areas.	This policy area should consider and include the interests and requirements of such PPPSAIs.

Transport Logistics and Customs

Providing an enabling environment for enhancement of trade with a focus on a greater market share of exports through removal of bottlenecks, reduction in transport costs, and facilitation of supply chain operations.

Policy measures

- Facilitate and enhance the expansion of international trade and tourism in general, and exports in particular.
- Ensure that economic decisions are, as far as is possible, left to market forces, subject to general competitive principles applicable to all industries, with a view to maximizing consumer choice, need satisfaction and job creation.
- Promote the development of an efficient and productive transport industry capable of competing in international markets.
- Standards of supply chain efficiency shall be set as objectives for the logistics industry based on a reliable performance-monitoring system.
- Government shall facilitate development of logistics centre s when economically justified through public-private partnerships.
- An automated commercial community single-window (one-stop) system shall be developed through a public-private partnership.
- Legislation shall be introduced that permits a bill of lading facilitating door-to-door (D-to-D) or terminal-to-terminal (T-to-T) shipments under a single document.
- Implementation of the Transports International Routers (TIR) agreement shall be completed after a full assessment of implications for Pakistan.
- Renewed efforts shall be made to implement the Transit Transport Framework Agreement.
- Monitoring of performance.

SEA objectives	Indicators	Significance		Recommendations
		Symbol	Description	
Improve accessibility to vital services and facilities and to reduce community severance.	• Public accessibility by transportation. • Distance travelled to work • Mode of travel to work • % of transport lines with proper corridors for communities (severance reduction) • %age employment share by transport • Share of transport sector to GDP (profit to cost ratio)	P + I LT	Enhancing trade of goods can have an indirect positive impact on improvement of accessibility to basic needs.	N/A
Enhance employment opportunities and expand prospects for sustainable economic development.		VP ++ D LT	Enhancing the expansion of international trade and tourism has a potential positive impact on economy and employment opportunity development.	N/A
Improve transport safety (reduce casualties) and security (crime and the fear of crime).	• Number of casualties and accidents • Increasing number of two wheelers and other accident causing vehicles • Crime and robbery rate	P - D LT	Crime and robbery is likely to occur during import/exports of goods internationally and nationally, while there is no proper measure or commitment mentioned in this policy area.	Define and include safety measures to improve transport safety and security.
Mitigate the impact of noise and light pollution at major urban centre s. To maintain and manage accessibility and local character of the landscape and green spaces. To maintain the conservation status of historic environment and heritage assets with known cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets	• Noise pollution in major traffic zones • Light pollution, Smog, night blight and haziness • Total area of woodland/extent of tree cover • Area of Greenfield lost and level of damage to green belts and designated landscapes along transport lines • Number of visitors to national parks and open spaces • Street clutters (sign boards and pamphlets etc along road sides) • Transport infrastructure functionality (well-designed transport lines) • Road density in protected and conservation areas	P --/?/+ I/D LT	The indirect negative impact is due to an uncertain expected increase in transport services for trade and tourism development which may lead to augment the problems of noise, light and air pollution and that can negatively effects the landscape character and heritage assets. The direct positive impact is due to the tourism development that can increase number of visitors to cultural sites and enhance the employment opportunities.	Include and strengthen the measures related to such problems handling which are mentioned in above policy areas of transport services and other related modes.

where feasible.	• Deterioration of buildings and monuments due to air pollution and vibration. • Number of visitors to cultural sites • % of cultural heritage sites accessible by public transport • % of GNP derived from heritage tourism • Number of people employed in heritage, museums and conservation services			
To sustain and enhance biodiversity, the viability of endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• % cover, area and condition of protected areas and forests • Level of damage to green belts along roads • Status of BAP recognized threatened ecosystems and species • Habitat fragmentation • Acidification and eutrophication in water bodies and their impacts on oceanic biodiversity	P -/? I LT	The indirect negative impact is due to an uncertain expected increase in transport services (road, rail, air and marine) for trade and tourism development which may increase the burden of pollution and disturbance on marine and terrestrial biodiversity (flora and fauna).	As above
To minimize the production of waste, and promote the sustainable use of natural resources, secondary and recycled materials. To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	• Total annual volume of waste generated. • Proportion of waste recycled/disposed • Increase in the Energy consumption • Consumption of renewable energy by transportation • Quantity of electricity generated from renewable sources • Proportion (%) of electricity generated from renewable sources • Renewable Energy Potential (by type)	P - D/I LT	The direct negative impact on waste generation is due to tourism development because tourism can augment the problem of waste generation. Also increasing trade and tourism will lead to increase the transport services which will indirectly increase the energy consumption level, while this policy area has no commitment towards such problems handling.	This specific policy area should commit and impose the measures for reducing and handling of waste generation through trade and tourism development. Also include and strengthen the measures related to energy efficiency and use of renewable energy in transport services
Maintain and improve air quality	• Increase in the level of PM	P	Enhancing the expansion of international	Include and strengthen

particularly in major cities. Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	• levels of key air pollutants (SO_2, NOx, N_2O, NO_2) • Migration rate to urban centres • Population growth rate in urban agglomerations. • %age of Population exposed to levels of PM • Increasing level of rickshaws and two wheelers • Increase in the number of private motorcars	- I LT	trade and tourism will indirectly need more transport services which can augment the problem of air pollution.	the measures related to handle air pollution problem in above policy areas of transport services and other related modes.
To ensure GHG emission level is not exceeding the national and international limits acceptable. Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Increase in the Energy consumption • Increase in GHG level • Temperature rise in Pakistan • Increase in the intensity and severity of floods • Annual cost of flooding (to insurers, to authority) • Monsoon contingency plans prepared • % of land with impermeable/sealed/ compacted surface with transport infrastructure • Area of proposed new development in flood zones	P -/? I LT	Enhancing trade and tourism development will need more transport services which will indirectly increase the energy consumption and hence GHG emission level. Also this policy area did not mention how to deal with the climate change impacts if happens, because floods and storms etc. can negatively affect trade services and goods stored in warehouses etc.	Include and strengthen the measures related to energy efficiency and use of renewable energy in transport services of other relevant modes. Also, this specific policy area should define how to deal with climatic calamities if happens.
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil. Minimize the adverse effects of transport on fresh water quantity and quality of inland, marine and ground water.	• Area of proposed new development on Greenfield sites • Area of soil lost to impermeable/compacted and sealed surfaces • Soil degradation and loss of topsoil • Land contamination • Excess of nitrogen, ammonia and acid critical loads • Unsustainable transport infrastructure development. • Decrease in Per capita water availability	P - I LT	Tourism and trade development can augment the problem of waste generation which indirectly can contaminate the concerning land and water quality.	This specific policy area should commit and impose the measures for reducing and handling of waste generation through trade and tourism development activities.

	• Decreasing quantity of fresh water sources • Deteriorating quality of water sources			
To integrate National Transport Policy with other Government policies and objectives.	Relevant objectives of • National Environmental Policy, 2005 • NSDS, 2012 • National Climate Change Policy, 2012 • National Drinking Water Policy, 2009 • PEPA, 1997 • Disaster Risk Reduction Policy, 2013 • National Conservation Strategy, 1991 • Biodiversity Action Plan Pakistan, 1999	VP - D LT	This specific policy area totally ignores the relevant environmental aspects which can be adversely affected by the activities of trade and tourism development, and which can lead to inconsistency with such PPPSAIs requirements and objectives.	Policy area should consider the relevant aspects of environment affected and propose measures for its protection and conservation.

Urban Transport

Improving accessibility, affordability, reliability, and safety for the public while optimizing management and use of the road network in urban areas.

Policy measures

• There should be a shift away from narrowly defined systems towards systems that are designed and managed to benefit all passengers. Competition is to be promoted where ever possible.

• Urban road space usage shall be optimized based on reliable traffic data and globally recognized traffic management techniques given existing land use patterns. City and town administrations are to prepare transport master-plans.

• Contracts will only be awarded to privately-owned or corporatized municipal bus companies and registered minibus operators to ensure that there is fair competition among competing providers.

• Transport authorities, in consultation with communities, must define passenger transport needs at affordable fare levels.

• Acceptable levels of congestion, road safety, traffic circulation patterns, available parking space, and air quality shall be established prior to implementing any transport management initiative to facilitate achievement of the above mentioned objectives.

• Increase productivity of urban transport system by increasing the use of large buses on priority lanes first and then consider investment in other mass transit systems, new or improved technology (e.g. ITS), behavior modification and land use change approaches.

• Investment in new urban roads and fixed rail mass transit systems shall be justified on the basis of established evaluation criteria taking into account cost, social, and environmental impacts.

• Alternative transport management mechanisms shall be considered in any transport investment proposal.

• Rail operations should be based on operating and maintenance concessions awarded by transport authorities and based on a transport plan.

• The base mechanism for deciding when to subsidize road-based public transport should be the competitive tender.

• Urban transport fares should be indexed with fuel prices and variation of fares should be automatic in accordance with the agreed formula.				
SEA objectives	**Indicators**	**Significance**		**Recommendations**
		Symbol	**Description**	
Improve accessibility to vital services and facilities and to reduce community severance. Enhance employment opportunities and expand prospects for sustainable economic development.	• Public accessibility by transportation. • Distance travelled to work • Mode of travel to work • % of transport lines with proper corridors for communities (severance reduction) • %age employment share by transport • Share of transport sector to GDP (profit to cost ratio)	VP ++/-/? D LT	Policy measures will improve accessibility, employment opportunities and economic development. Although there is a measure mentioned that investment in urban roads should be subjected to social and environmental assessment but, there is no proper commitment or measure included that can refers to the problem of community severance which can be a cause of transport lines and infrastructure development. Therefore the impact cannot be quantified or made certain.	This policy area shall include proper measures and framework with defined timelines and targets to handle the problem of community severance such as; through proper corridors and other connecting facilities.
Improve transport safety (reduce casualties) and security (crime and the fear of crime).	• Number of casualties and accidents • Increasing number of two wheelers and other accident causing vehicles • Crime and robbery rate	P +/? D/I LT	The direct positive impact is due to the establishment of road safety measures prior to implementing any transport management initiative while the indirect positive impact is due to establishing acceptable level of congestion, traffic circulation patterns, and available parking space prior to implementing any transport management initiative. It is also due to road space usage management, improving mass transit system, use of new or improved technology (e.g. ITS), behavior modification and land use change approaches. However this impact is uncertain and cannot be quantified because the measures do not commit to any degree of improvement in	In order to better quantify the impacts and to ensure that the impact is +ive, this policy area should pinpoint the targets and timelines indicating what safety and security measures are required and by when.

			safety and security. Without targets; nor the implementation of the measures can be monitored nor its achievement can be measured.	
Mitigate the impact of noise and light pollution at major urban centres. To maintain and manage accessibility and local character of the landscape and green spaces. To maintain the conservation status of historic environment and heritage assets with known cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets where feasible.	• Noise pollution in major traffic zones • Light pollution, Smog, night blight and haziness • Total area of woodland/extent of tree cover • Area of Greenfield lost and level of damage to green belts and designated landscapes along transport lines • Number of visitors to national parks and open spaces • Street clutters (sign boards and pamphlets etc. along road sides) • Transport infrastructure functionality (well-designed transport lines) • Road density in protected and conservation areas • Deterioration of buildings and monuments due to air pollution and vibration. • Number of visitors to cultural sites • % of cultural heritage sites accessible by public transport • % of GNP derived from heritage tourism • Number of people employed in heritage, museums and conservation services	P +/-/? D/I LT	This policy area mainly focuses on accessibility and improvement of passenger transport system through large buses and mass transit system in urban centres. Consequently, it can improve accessibility to open spaces and cultural heritage sites which will also develop the GNP. Also it can minimize the level of noise, light and air pollution, which has an indirect positive impact on landscapes and cultural heritage. But this policy area does not refer directly to such issues which made the impact uncertain. Also, the policy measure about investment in urban roads can have a negative impact on tree cover, green fields and green belts along road sides but this measure also states that this investment will be subjected to assessment of environmental impacts. Therefore the impact is uncertain because it is unclear to what "issue" the measure is referring to.	The measure on environmental impact assessment should make clearer reference to which issues and standards the measures is being addressed. Mention of protection of cultural sites and landscapes and minimizing light, noise and air pollution would strengthen the measure.
To sustain and enhance biodiversity, the viability of endangered species, habitats	• % cover, area and condition of protected areas and forests • Level of damage to green belts along roads	0	Generally, this policy area per se does not have a direct impact on biodiversity as it relate to urban areas. However, policy measure about	The measure on environmental impact assessment should make

and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• Status of BAP recognized threatened ecosystems and species • Habitat fragmentation • Acidification and eutrophication in water bodies and their impacts on oceanic biodiversity		investment in urban roads can have a negative impact on tree cover, green fields and green belts along road sides but this measure also states that this investment will be subjected to assessment of environmental impacts. Therefore the impact is uncertain because it is unclear to what "issue" the measure is referring to.	clearer reference to which issues and standards the measures is being addressed. Mention of "protection of biodiversity" would strength the measure.
To minimize the production of waste, and promote the sustainable use of natural resources, secondary and recycled materials. To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	• Total annual volume of waste generated. • Proportion of waste recycled/disposed • Increase in the Energy consumption • Consumption of renewable energy by transportation • Quantity of electricity generated from renewable sources • Proportion (%) of electricity generated from renewable sources • Renewable Energy Potential (by type)	P -/+/? D LT	The direct limited negative impact is due to the policy measure about investment in urban roads which can lead to waste generation but there is a degree of uncertainty because the measure also states that this investment will be subjected to assessment of environmental impacts and which is unclear to which "environmental issue" the measure is referring to, and what will be the targets and timelines. Policy measures like use of large buses and other mass transit systems instead of narrowly defined system, use of new or improved technology (e.g. ITS), behavior modification and land use change approaches will lead to reduce energy consumption.	The measure on environmental impact assessment should make clearer reference to which issues and standards the measures is being addressed. Mention of "minimize waste generation" would strength the measure. A commitment towards use of renewable energy shall also be included.
Maintain and improve air quality particularly in major cities. Reduce the need to travel by car and improve choice and	• Increase in the level of PM • levels of key air pollutants (SO_2, Nox, N_2O, NO_2) • Migration rate to urban centre s • Population growth rate in urban agglomerations. • %age of Population exposed to levels of PM	VP ++ D LT	This policy area mainly focuses on shifting of narrowly defined system to use of large buses and other mass transit system that can reduce dependency on personal cars, two wheelers and rickshaws which are responsible for emission of PM and other pollutants in cities. These measures and the use of new or	N/A

use of more sustainable transport modes.	• Increasing level of rickshaws and two wheelers • Increase in the number of private motorcars		improved technology (e.g. ITS), behavior modification and land use change approaches can also lead to reduce energy consumption and consequently reduces the level of air pollutants.	
To ensure GHG emission level is not exceeding the national and international limits acceptable. Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Increase in the Energy consumption • Increase in GHG level • Temperature rise in Pakistan • Increase in the intensity and severity of floods • Annual cost of flooding (to insurers, to authority) • Monsoon contingency plans prepared • % of land with impermeable/sealed/ compacted surface with transport infrastructure • Area of proposed new development in flood zones	VP +/-/? D LT	The positive impact is due to the measures like use of large buses and other mass transit systems instead of narrowly defined system, use of new or improved technology (e.g. ITS), behavior modification and land use change approaches which can reduce energy consumption and consequently can help to reduce GHG emission level. The uncertain negative impact is due to the policy measure of investment in urban roads which can lead to land surface compaction and sealing. This policy measure also commit for environmental impact assessment but lack in the exact commitment and targets towards management of climate change impacts and land compaction and sealing issues.	To avoid loss due to climate change impacts; storm and flood water management techniques shall be defined and implemented. To reduce land compaction and sealing; permeable material shall be used during investment in urban roads.
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil. Minimize the adverse effects of transport on fresh water quantity and quality of inland, marine and ground water.	• Area of proposed new development on Greenfield sites • Area of soil lost to impermeable/compacted and sealed surfaces • Soil degradation and loss of topsoil • Land contamination • Excess of nitrogen, ammonia and acid critical loads • Unsustainable transport infrastructure	P -/? D/I LT	The uncertain negative impact is due to the policy measure of investment in urban roads which can lead to land surface compaction, sealing, soil degradation and contamination and waste generation which can indirectly lead to contaminate water bodies. But this policy measure also commit for environmental impact assessment however, it lacks in the exact commitment and targets towards management	Use of impermeable materials such as tarmac etc. shall be avoided and permeable material shall be used during investment in urban roads.

	development. • Decrease in Per capita water availability • Decreasing quantity of fresh water sources • Deteriorating quality of water sources		of such problems.	
To integrate National Transport Policy with other Government policies and objectives.	Relevant objectives of • National Environmental Policy, 2005 • NSDS, 2012 • National Climate Change Policy, 2012 • National Drinking Water Policy, 2009 • PEPA, 1997 • Disaster Risk Reduction Policy, 2013 • National Conservation Strategy, 1991 • Biodiversity Action Plan Pakistan, 1999	P - D LT	As mentioned above this policy area ignores some of the environmental issues which lead to inconsistency with such government policies and objectives.	To produce synergy, this specific policy area should consider relevant environmental problems as pointed above, and must consider the measures suggested above.

Inter-modal Transfers

Strengthening connectivity comfort and effectiveness for passengers and freight to maximize use of terminals and minimize modal transfer penalties. Ensuring that all the parts and facets of the transportation process, including information exchange, are efficiently linked and coordinated, offering flexibility.

Policy measures

• Provision of standard facilities for transfer to the same or other modes should be ensured by the government at airports.

• Operation of regular services between airports and selected city terminals.

• Airport authorities shall coordinate with public and private parties for setting up special arrangements for the transfer of "tourists" and availability of consulting and meeting facilities.

• Airlines would extend their operations for attracting more tourist traffic through partnership agreements and joint ventures for land transport and tours for medium to large groups. The Government will provide incentives for such ventures or arrangements.

• The Government will support chartered flights to airports and provide special facilitation or arrangements for the passenger, cargo and intermodal transfers at the airport.

• The railway authority will provide clean and comfortable facilities such as waiting areas, comfort places, dinning places with adequate facilities, parking and transfer space at railway stations.

• Municipal bus terminals shall be modernized and made more attractive and better organized with local gender considerations. Connecting local bus or coach services and reasonable facilities for passengers.

• Inter-modal transfer facilities shall be given increased priority in order for the ports to remain efficient and competitive. The port/rail interface shall be improved where

demand warrants it.				
SEA objectives	**Indicators**	**Significance**		**Recommendations**
		Symbol	**Description**	
Improve accessibility to vital services and facilities and to reduce community severance. Enhance employment opportunities and expand prospects for sustainable economic development.	• Public accessibility by transportation. • Distance travelled to work • Mode of travel to work • % of transport lines with proper corridors for communities (severance reduction) • %age employment share by transport • Share of transport sector to GDP (profit to cost ratio)	VP ++ D LT	Providing facilities to the passengers and strengthening connectivity between modes will reduce distance and time for travel and hence will improve accessibility. These measures will also reduce cost of transportation and modal transfer penalties which will contribute to sustainable economy.	N/A
Improve transport safety (reduce casualties) and security (crime and the fear of crime).	• Number of casualties and accidents • Increasing number of two wheelers and other accident causing vehicles • Crime and robbery rate	0	Inter modal transfer has no direct impact on public safety and security however coordination of regular services among transport modes can reduce congestion which can improve public safety level.	Safety and security measures and standards for tourism must be considered.
Mitigate the impact of noise and light pollution at major urban centre s. To maintain and manage accessibility and local character of the landscape and green spaces. To maintain the conservation status of historic environment and heritage assets with known cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets where feasible.	• Noise pollution in major traffic zones • Light pollution, Smog, night blight and haziness • Total area of woodland/extent of tree cover • Area of Greenfield lost and level of damage to green belts and designated landscapes along transport lines • Number of visitors to national parks and open spaces • Street clutters (sign boards and pamphlets etc. along road sides) • Transport infrastructure functionality (well-designed transport lines) • Road density in protected and conservation	P ++ I LT	Effective inter modal transfer and coordination of regular services among transport modes can reduce congestion and hence noise and light pollution. This will also reduce the need for car and taxi parking areas which will reduce the burden on green spaces along roads. Extending operations for attracting more tourist traffic will increase visitor's number in cultural sites and parks which will contribute to GNP and will create employment opportunities.	N/A

	areas • Deterioration of buildings and monuments due to air pollution and vibration. • Number of visitors to cultural sites • % of cultural heritage sites accessible by public transport • % of GNP derived from heritage tourism • Number of people employed in heritage, museums and conservation services			
To sustain and enhance biodiversity, the viability of endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• % cover, area and condition of protected areas and forests • Level of damage to green belts along roads • Status of BAP recognized threatened ecosystems and species • Habitat fragmentation • Acidification and eutrophication in water bodies and their impacts on oceanic biodiversity.	P +/- I LT	At general there is no proper direct impact of inter modal transfer on biodiversity however it can reduces burden on it through congestion reduction and effective coordination of transport modes. Extending operations for attracting more tourist traffic can increase the burden on biodiversity resources and conservation areas.	Emphasis on tourism activities management shall be given priority.
To minimize the production of waste, and promote the sustainable use of natural resources, secondary and recycled materials.	• Total annual volume of waste generated. • Proportion of waste recycled/disposed • Increase in the Energy consumption • Consumption of renewable energy by transportation	P - D LT	Attracting more tourist traffic can increase the problem of waste generation through tourism activities.	As above
To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	• Quantity of electricity generated from renewable sources • Proportion (%) of electricity generated from renewable sources • Renewable Energy Potential (by type)	P + I LT	Effective coordination among transport modes for services provision can reduce energy consumption through reduction in congestion and dependency on individual conveyance like personal cars and taxi etc. Improving port/rail interface can reduce dependency on individual trucks and hence can reduce energy consumption level.	

Maintain and improve air quality particularly in major cities. Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	• Increase in the level of PM • levels of key air pollutants (SO_2, NOx, N_2O, NO_2) • Migration rate to urban centre s • Population growth rate in urban agglomerations. • %age of Population exposed to levels of PM • Increasing level of rickshaws and two wheelers • Increase in the number of private motorcars	P + D LT	Effective coordination among transport modes for services provision can reduce congestion and dependency on individual conveyance like personal cars, taxis, rickshaws and two wheelers and hence can reduce emission level of PM and other pollutants.	N/A
To ensure GHG emission level is not exceeding the national and international limits acceptable. Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Increase in the Energy consumption • Increase in GHG level • Temperature rise in Pakistan • Increase in the intensity and severity of floods • Annual cost of flooding (to insurers, to authority) • Monsoon contingency plans prepared • % of land with impermeable/sealed/ compacted surface with transport infrastructure • Area of proposed new development in flood zones	P +/0 I LT	Effective coordination among transport modes for services provision can reduce energy consumption through reduction in congestion and dependency on individual conveyance which can in turn help reduce GHG emissions at limited level.	N/A
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil. Minimize the adverse effects of transport on fresh water quantity and quality of inland, marine and ground water.	• Area of proposed new development on Greenfield sites • Area of soil lost to impermeable/compacted and sealed surfaces • Soil degradation and loss of topsoil • Land contamination • Excess of nitrogen, ammonia and acid critical loads • Unsustainable transport infrastructure development.	0	Inter modal transfer policy have no developmental objective and hence have no direct impact on land or water contamination. Tourism improvement can have a negative impact on soil and water bodies' contamination through waste generation ability and other related activities.	This policy area shall consider tourism activities management prior than its development.

	• Decrease in Per capita water availability • Decreasing quantity of fresh water sources • Deteriorating quality of water sources			
To integrate National Transport Policy with other Government policies and objectives.	Relevant objectives of • National Environmental Policy, 2005 • NSDS, 2012 • National Climate Change Policy, 2012 • National Drinking Water Policy, 2009 • PEPA, 1997 • Disaster Risk Reduction Policy, 2013 • National Conservation Strategy, 1991 • Biodiversity Action Plan Pakistan, 1999	P 0/- I ST	Although intermodal transfer policy have large positive effects on certain environmental indicators but it also violates some of the objectives provided in these PPPSAIs through tourism improvement.	As above

Legal Considerations and Related Policies

Supporting regulation, developing and harmonizing the implementation structures to reduce the cost of transportation and increased traffic and trade and maximizing the benefits to society in general.

Policy measures

• Minimize the legal constraints at the first stage and eliminate all unreciprocated legalities that constrain international trade and transit.

• Charging and setting of optimum transit fees for international traffic is to be examined and fees set at levels comparable to regional competitors in South and Central Asia.

• Trade, transit and transport agreements with neighboring countries, particularly Iran, India and Afghanistan need to be updated and implemented.

• New York Convention on Recognition and Enforcement of Arbitral Awards relating to contractors' claims, disputes and arbitration procedures needs to be fully implemented.

• The system for adequate insurance coverage need to be better defined or introduced into existing legislation.

• Appropriate national legal and regulatory frameworks to enable, encourage and promote all public-private partnerships in transport infrastructure projects and services shall be put in place.

• Regulations for freight transport insurance and financial practices related to freight-forwarding need to be revised with a view to liberalizing requirements or practices that might hinder D-to-D/T-to-T operations.

SEA objectives	Indicators	Significance		Recommendations
		Symbol	Description	
Improve accessibility to vital services and facilities and to reduce community severance. Enhance employment opportunities and expand prospects for sustainable economic development.	• Public accessibility by transportation. • Distance travelled to work • Mode of travel to work • % of transport lines with proper corridors for communities (severance reduction) • %age employment share by transport • Share of transport sector to GDP (profit to cost ratio)	P + D LT	Minimizing legal constraints and eliminating unreciprocated legalities for international trade and transit; and liberalizing regulations on freight and transport forwarding can help improve accessibility to basic needs. These can also reduce the cost of transportation and increased traffic and trade which can contribute to economic development.	N/A
Improve transport safety (reduce casualties) and security (crime and the fear of crime).	• Number of casualties and accidents • Increasing number of two wheelers and other accident causing vehicles • Crime and robbery rate	P + D LT	Although there is no emphasis given on regulations related to public safety and security but there is a commitment toward supporting regulation and maximizing benefit to society in general. Also defining the system for adequate insurance coverage for vehicle accident coverage can have a positive impact.	In order to maximize the benefits for society; this policy area shall emphasize on supporting the regulations about safety and security.
Mitigate the impact of noise and light pollution at major urban centre s. To maintain and manage accessibility and local character of the landscape and green spaces. To maintain the conservation status of historic environment and heritage assets with known cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets	• Noise pollution in major traffic zones • Light pollution, Smog, night blight and haziness • Total area of woodland/extent of tree cover • Area of Greenfield lost and level of damage to green belts and designated landscapes along transport lines • Number of visitors to national parks and open spaces • Street clutters (sign boards and pamphlets etc along road sides) • Transport infrastructure functionality (well-designed transport lines)	P 0/- I LT	This policy area mainly emphasis on international trade and transit improvement through liberalizing regulations, therefore these measures are unlikely to directly affect these SEA objectives. However air pollution can be increased due to increased trade and transit which can have an indirect negative effect on cultural monuments and buildings.	Emphasis shall be given on regulations related to noise, air or light pollution control or preserving the landscapes or cultural heritage assets. No compromise shall be given on implementation of such regulations.

where feasible.	• Road density in protected and conservation areas • Deterioration of buildings and monuments due to air pollution and vibration. • Number of visitors to cultural sites • % of cultural heritage sites accessible by public transport • % of GNP derived from heritage tourism • Number of people employed in heritage, museums and conservation services			
To sustain and enhance biodiversity, the viability of endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• % cover, area and condition of protected areas and forests • Level of damage to green belts along roads • Status of BAP recognized threatened ecosystems and species • Habitat fragmentation • Acidification and eutrophication in water bodies and their impacts on oceanic biodiversity.	P 0/- I LT	Increasing trade and improving transit system can increase the burden on biodiversity due to air pollution and other disturbances created.	Emphasis shall be given rather than compromising the regulations related to protection of biodiversity. Also include measures and targets for protection of biodiversity to minimize the effects of increasing trade and transit on biodiversity.
To minimize the production of waste, and promote the sustainable use of natural resources, secondary and recycled materials. To minimize energy consumption, promote higher energy efficiency and encourage	• Total annual volume of waste generated. • Proportion of waste recycled/disposed • Increase in the Energy consumption • Consumption of renewable energy by transportation • Quantity of electricity generated from renewable sources • Proportion (%) of electricity generated from	P - D LT	This policy area mainly emphasizes on increasing trade and improving transit system through liberalizing and minimizing the legal constraints which can increase energy consumption level and also can have limited effect on increasing waste generation.	Regulations related to energy efficiency and use of renewable sources shall be included and be emphasized. Emphasis shall also be given on proper waste

the use of renewable energy in transport sector.	renewable sources • Renewable Energy Potential (by type)			disposal methods and reducing waste produced through freight and other trade related activities.
Maintain and improve air quality particularly in major cities. Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	• Increase in the level of PM • levels of key air pollutants (SO_2, NOx, N_2O, NO_2) • Migration rate to urban centre s • Population growth rate in urban agglomerations. • %age of Population exposed to levels of PM • Increasing level of rickshaws and two wheelers • Increase in the number of private motorcars	P 0/- D LT	This policy area mainly emphasizes on increasing trade and improving transit system through liberalizing and minimizing the legal constraints which can increase level of key air pollutants emission if not in cities but can in shared atmosphere. The policy area has no specific impact on mode of travel.	Emphasis shall be given rather than compromising the regulations related to air pollution control.
To ensure GHG emission level is not exceeding the national and international limits acceptable. Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Increase in the Energy consumption • Increase in GHG level • Temperature rise in Pakistan • Increase in the intensity and severity of floods • Annual cost of flooding (to insurers, to authority) • Monsoon contingency plans prepared • % of land with impermeable/sealed/ compacted surface with transport infrastructure • Area of proposed new development in flood zones	P - D LT	Liberalizing or minimizing the unreciprocal legalities and constraints will increase trade, transit and freight forwarding system which will need more energy sources and hence can contribute to GHG emission level and factors of climate change and its impacts.	Regulations related to energy efficiency and use of renewable sources shall be included and be emphasized rather than compromised.
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil.	• Area of proposed new development on Greenfield sites • Area of soil lost to impermeable/compacted and sealed surfaces • Soil degradation and loss of topsoil	0	This policy area mainly deals with international trade and transit improvement through liberalizing regulations; therefore these measures are unlikely to directly or specifically affect these SEA objectives.	Regulations related to land and water sources protection shall be included and be emphasized rather

Minimize the adverse effects of transport on fresh water quantity and quality of inland, marine and ground water.	• Land contamination • Excess of nitrogen, ammonia and acid critical loads • Unsustainable transport infrastructure development. • Decrease in Per capita water availability • Decreasing quantity of fresh water sources • Deteriorating quality of water sources			than compromised
To integrate National Transport Policy with other Government policies and objectives.	Relevant objectives of • National Environmental Policy, 2005 • NSDS, 2012 • National Climate Change Policy, 2012 • National Drinking Water Policy, 2009 • PEPA, 1997 • Disaster Risk Reduction Policy, 2013 • National Conservation Strategy, 1991 • Biodiversity Action Plan Pakistan, 1999	P ?/- D LT	The impact is considered uncertain because this policy area although commits for supporting regulations and maximizing benefits for society but in the measures followed it do not refer to any regulation or objective mentioned in these relevant PPPSAIs which can lead to inconsistency and can lead to negative impacts.	Regulations related to environmental protection and conservation shall be included and be emphasized rather than compromised.

4.7. Monitoring framework

The SEA objectives and indicators, identified in Table 4.2 provide the most appropriate tool for monitoring the significant environmental impacts of the NTP implementation. Table 4.11 below provide the main proposals for monitoring how well the NTP achieves SEA objectives and how will monitor the potential negative impacts identified in Table 4.10 above. It is recommended that positive impacts are also to be monitored.

Difficulties encountered with monitoring include the data collection itself as stated above in baseline information. Due to limited time and resources, it is not always possible to provide all the data that would ideally be useful for monitoring the progress of the NTP towards the SEA objectives. Moreover, it is difficult to relate the data directly to NTP implementation only. It is also possible that some other factors may affect that data. This could produce difficulties when deciding on appropriate remedial action.

Table 4.11: Monitoring Plan

SEA objective	Indicator	When to monitor	Who to monitor
Improve accessibility to vital services and facilities for those without a car and to reduce community severance.	• Accessibility to transportation	Annually	NTRC
	• Mode of travel to work	Monthly	NTRC
	• Transport lines with proper corridors	Annually	NTRC
Enhance employment opportunities and expand prospects for sustainable economic development.	• Employment share by transportation	Annually	NTRC and PBS
	• Share of transportation in GDP	Annually	NTRC and PBS
Improve transport safety (reduce casualties) and security (crime and the fear of crime).	• Number of casualties and accidents	Monthly	Can be collected from police departments
	• Number of accident causing vehicles	Annually	NTRC
	• Passengers robbed and other crimes	When required	Can be collected from police departments
Mitigate the impact of noise and light pollution at major urban centre s.	• Noise level in major traffic zones	Hourly	EPA
	• Level of light pollution, smog etc due to transportation	Annually (in arrears)	EPA, Consultation and research team
To maintain and manage accessibility and local character of the landscape and green spaces.	• Area and extent of woodland and tree cover, Greenfield and designated landscapes lost due to transportation schemes	Annually and when required	Information recorded when transport schemes progress
	• % of well-designed transport lines	during design	NTRC
	• Road density in protected and conservation areas	during design	NTRC and EPA
To maintain the conservation status of historic environment and heritage assets with known cultural/ archaeological remains, and encourage ecotourism and accessibility of heritage assets where feasible.	• Deterioration of buildings and monuments due to air pollution and vibration.	When required	EPA, Consultation and research team
	• Number of visitors to cultural sites, national parks and open spaces	Monthly	Departments of Archaeology and Museum
	• % of cultural heritage sites accessible by public transport	Annually	NTRC and Departments of Archaeology and Museum
	• Share of heritage tourism in GNP	Annually	Departments of Archaeology and Museum
	• Employment share by heritage, museums and	Annually	Departments of Archaeology and

	conservation services		Museum
To sustain and enhance biodiversity, the viability of endangered species, habitats and sites of geological importance in line with Biodiversity Action Plan objectives and actions.	• % cover, area and condition of protected areas and forests	Annually	Local Forest departments and EPA
	• Status of BAP recognized threatened ecosystems and species	Annually	Consultation and research team, wild life departments
	• Level of wildlife habitat fragmentation	Annually (in arrears)	Forest and wildlife departments. Information can also be recorded during transport schemes progress.
To minimize the production of waste, and promote the sustainable use of natural resources, secondary and recycled materials. To minimize energy consumption, promote higher energy efficiency and encourage the use of renewable energy in transport sector.	• Total annual volume of waste generated	Annually	Local TMAs
	• Proportion of waste recycled/disposed	Annually	Local TMAs
	• Energy consumption by transportation	Monthly	Ministry of Petroleum And Natural Resources, HDIP
	• Consumption of renewable energy by transportation	Annually	AEDB, PCRET
	• Renewable Energy Potential (by type)	Annually	AEDB, PCRET
Maintain and improve air quality particularly in major cities. Reduce the need to travel by car and improve choice and use of more sustainable transport modes.	• Levels of PM and key air pollutants by transportation	Weekly	EPA, Consultation and research team
	• Migration rate to urban centres	Annually	PIPS
	• Population growth rate in urban agglomerations.	Annually	PIPS
	• %age of Population exposed to levels of PM	Annually	Consultation and research
	• Increasing level of rickshaws and two wheelers and private motorcars	Annually	NTRC
To ensure GHG emission level is not exceeding the national and international limits acceptable. Reduce transport sector's vulnerability to the climate change impacts (e.g. flooding) as well as its contribution to the problem.	• Increase in GHG level by transportation	Annually	SUPARCO, MOC
	• Temperature rise in Pakistan	Annually	Metrological departments
	• Level of intensity and severity of floods	Annually	NDMA and PDMAs
	• Annual cost of flooding to transportation	Annually	NDMA and PDMAs
	• Land with impermeable/compacted surface with	When required	Information recorded when

	transport infrastructure		transport schemes progress
To use land effectively and efficiently, minimize contamination and protect the quality, quantity and function of soil.	• Area of proposed new development on Greenfield sites	When required	Information recorded when transport schemes progress
	• Soil degradation and loss of topsoil by transportation infrastructure	When required	Information recorded when transport schemes progress
	• Land contamination level by transportation	When required	Consultation and research team
Minimize the adverse effects of transport on fresh water quantity and quality of inland, marine and ground water.	• Quality of transport infrastructure (material used etc.)	When required	Information recorded when transport schemes progress
	• Per capita water availability	Annually	Consultation and research team, PCRWR
	• Quantity of fresh water sources	Annually	Consultation and research team, PCRWR
	• Quality of water sources	Annually	EPA, PCRWR

CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

Based on the findings of this study, it can be concluded that SEA can facilitate design and sustainable implementation of Draft National Transport Policy of Pakistan. However implementation and enforcement of existing environmental regulations of the country is weak and the introduction of SEA still remains an unsolved question. Most of the PPPs involving huge investments and infrastructure development are facing implementation problems while SEA is emerging as a solution to the problem. But the planning and implementing authorities lack the capacity to relate implementation discrepancies with absence of SEA regime. Therefore, there is a need to build acceptability of SEA among the planning and executing authorities prior to introduction of SEA as a legal requirement in Pakistan. While assessing the draft NTP the main issues and results drawn are as follows

1) Most of the policy areas and measures completely overlook the relevant environmental aspects affected and has lack of commitments towards its solution.
2) It was also concluded that the draft NTP do not encourage energy efficiency and the use of natural gas or renewable energy.
3) Potential negative impacts originates where the policy areas regarding accessibility and infrastructure development, encouraging transport services, trade and tourism are contemplated.
4) Where a policy area or measure has the potential for a positive impact on the environment, that impact is limited in scope and certainty, because the concerned policy area lacks clear targets to be reached, dates for implementation, responsibility, etc. This rendered the assessment highly uncertain.
5) Most of the policy measures need quantifiable target and timescale for achievement.
6) There were some policy areas and measures which were administrative in nature (such as policy areas 10 and 11) and therefore didn't have much larger impacts on many aspects of the environment.

5.2. Recommendations

The assessment process proposed mitigation measures for minimization of potential negative impacts as well as measures to enhance potential positive impacts. These potential

measures are highly recommended to be adopted and implemented with NTP. However, some general recommendations for overall study are proposed below.

i. In order to have a sustainable transportation system, a detailed periodic transport plan should be prepared by NTRC in collaboration with EPA through the experience gained from other countries and Development Co-operations.

ii. Coordination mechanisms among all relevant departments and appropriate management tools are required to introduce SEA in Pakistan.

iii. SEA should be mandatorily applied to future developmental PPPs (e.g. Pak-China economic corridor) or re-organization on transport (e.g. re-distribution of public transport route).

iv. Trained and highly qualified experts are needed for carrying out SEA. Besides, a specific guidance document should be published for guiding the responsible person/authority on what to consider and how to conduct the environmental impacts during decision making on transport related PPPs.

v. It may be useful to carry out SEA process in consultation with the relevant stakeholders such as public consultation is widely adopted as a procedure to collect the comment for the proposed PPP in those reviewed countries. These comments can be collected by means of internet, surveys, seminar and individual workshop. An individual report can also be prepared to summarise and analyse those collected comments.

vi. NTP should include an SEA monitoring framework which should be carried out as part of the NTP monitoring framework, where possible.

vii. In NTP, adequate financial support is needed to make the environment a priority.

viii. Research on Methodological guidance for SEA application and especially for the integration of baseline information in Pakistan is needed.

ix. Involvement by communities, non-governmental organizations (NGOs) and the private sector is needed in SEA.

x. Awareness programs should be initiated that provide messaging on specific topics on SEA and sustainable urban transport.

xi. Supporting curriculum development in national technical and academic institutes on SEA, sustainable urban transport and urban planning.

REFERENCES

Bunge, T. (1998). Strategic Environmental Impact Assessment in Land Use Planning: The Erlangen Case Study. In: *Strategic Environmental Assessment in Europe*. Springer Netherlands.

Dalal-Clayton, & Sadler, B. (2005). Strategic Environmental Assessment: A source book and reference guide to international experience. Earthscan. London, Great Britain.

DoT (Department of Transport), (2004). TAG Unit 2.11: Strategic Environmental Assessment for Transport Plans and Programmes, UK.

EC (European Commission) (2001). DG Environment. Strategic Environmental Assessment of Transport Corridors: Lesson learned compared the methods of five Member States. Brussels.

EC (European Commission), (2000). Strategic Environmental Assessment in the Transport Sector: An overview of legislation and practice in EU Member States. DG Environment. Brussels.

EC (European Commission), (2005). DG for Energy and Transport. BEACON. SEA Manual. Brussels.

ECMT (European Conference of Ministers of Transport), (1998). Strategic Environmental Assessment in the Transport Sector. OECD Publications Service. Paris, France.

ECMT (European Conference of Ministers of Transport), (2000). Strategic Environmental Assessment for Transport. OECD Publications Service. Paris, France.

EEA (European Environmental Agency), (1998). "Spatial and Ecological Assessment of the TEN: Demonstration of Indicators and GIS Methods". *Environmental Issues Series,* No. 11. Copenhagen.

Fischer, T.B. (2002). Strategic Environmental Assessment in Transport and Land-use Planning. Earthscan, London.

Fischer, T.B. (2004). Transport policy making and SEA in Liverpool, Amsterdam and Berlin—1997 and 2002. *Environmental Impact Assessment Review*, **24**(3).

Fischer, T.B. (2006). SEA and transport planning: towards a generic framework for evaluating practice and developing guidance, Impact Assessment and Project Appraisal, **24**(3).

Furman, E. (2001). Transport Planning: Does the Influence of Strategic Environmental Assessment/integrated Assessment Reach Decision-making; *Final Report of a Workshop*. Ministry of the Environment.

Kornov, L., & Thissen, W. A. (2000). Rationality in decision-and policy-making: implications for strategic environmental assessment. *Impact assessment and project appraisal*, **18**(3).

Lee, N., & Walsh, F. (1992). Strategic environmental assessment: an overview. *Project appraisal*, **7**(3).

McGimpsey, P., & Morgan, R. K. (2013). The application of Strategic Environmental Assessment in a non-mandatory context: Regional transport planning in New Zealand. *Environmental Impact Assessment Review*, **43**(1).

Nitz, T., & Brown, A. L. (2001). SEA must learn how policy making works. *Environmental Assessment Policy and Management*, **3**(3).

ODPM, (Office of Disaster Preparedness and Management), (2005). A Practical Guide to the Strategic Environmental Assessment Directive. Scottish Executive, Welsh Assembly Government and Department of the Environment, Northern Ireland, London. http://www.communities.gov.uk/publications/planningandbuilding/practicalguidesea

OECD (Organization for Economic Corporation and Development), (2005). Applying Strategic Environmental Assessment: Good Practice Guidance for Development Cooperation, Part I.

Parkhurst, G. and Richardson, J. (2002). Modal integration of bus and car in UK local transport policy: the case for strategic environmental assessment. *Transport Geography*, **10**(3).

Qureshi, I. A. and Huapu, L. (2007). Urban transport and sustainable transport strategies: a case study of Karachi, Pakistan. *Tsinghua Science & Technology*, **12**(3).

Sadler, B. and Verheem R. (1996). Strategic Environmental Assessment - Status, Challanges and Future Directions. Ministry of Housing, Spatial Planning and the Environment of the Netherlands. The Hague, Netherlands.

Sheate, W. R., Byron, H. J. and Smith, S. P. (2004). Implementing the SEA Directive: sectoral challenges and opportunities for the UK and EU. *European Environment*, **14**(2).

Spaethling, D. (1996). Sustainable Transportation: the American experience. In: *Proceedings of Seminar C. Planning for Sustainability of the 24th European Transport Forum.* Education and Research Services Limited. London, England.

Therivel, R. and Partidário, M. (1996). The practice of Strategic Environmental Assessment. Earthscan, London.

Therivel, R., Wilson, E., Thompson, S., Heaney, D. and Pritchard, D. (1992). Startegic Environmental Assessment. Earthscan, London.

USG (United States Government), (1969). National Environmental Policy Act, Public Law, 91-190, 91st Congress, S. 1075, 1st January, 1970, Washington DC.

WB, (2006). Environmental Impact Assessment Regulations and Strategic Environmental Assessment Requirements. Practices and lessons learned in East and Southeast Asia. Environment and Social Development Department. World Bank. Washington D.C.

Wood, C. (2002). Environmental Impact Assessment: A Comparative Review. Prentice Hall, New Jersey.

Wright, F. (2006). The Purposes and Benefits of Undertaking Strategic Environmental Assessment: The Case of Scotland in the Mid-Late 1990s, unpublished PhD Thesis, University of Strathclyde, Glasgow.

BASLINE INFORMATION

Accessibility to transportation

Accessibility provided by the road network is limited. Road density is low (0.32 km/square km) and Pakistan does not compare favorably with other countries in the sub-region (Bangladesh-1.7 km/square km, Sri Lanka-1.5 km/square km and India-1.0 km/square km). At the current growth rate of the road network (4.2 percent during the past decade), it will take 50 years to arrive at the density in India (PHRP, 2010).

Pakistan's inland freight and passenger traffic has been growing at an average annual rate of 12% and 5% respectively during the past two decades. With the performance of Pakistan Railways (PR) deteriorating during the same period, the road has progressively increased its share of the transport market. As a result, the road sector now carries over 96% of the inland freight (146.6billion ton-km – 241million tons/year) and 92% of the passenger traffic (220billion passenger-km - 780million passengers/year). Thus, Pakistan's economy relies almost entirely on road transportation to carry the inland freight (PHRP, 2010).

Table A.1: Road and railway routs length and its carriage capacity

Year	Length of roads (000km)			Railways				
	Total	High type	Low type	Route (km.)	Passengers carried in millions	Freight carried (M.Tons)	Locomotives (Nos.)	Freight wagons (Nos.)
1999-00	248.34	138.2	110.14	7,791	68.00	4.77	597	23,906
2004-05	258.21	162.84	95.37	7,791	78.18	6.41	557	21,556
2009-10	260.76	180.91	79.85	7,791	74.93	5.83	528	16,499
2013-14	263.75	184.12	79.63	7,791	118.00	1.10	507	16,197

Adapted: GoP, 2013-14

The easy availability of credit in the past few years and lack of a proper public transportation system has caused the increase in the number of vehicles. Although public transport usage is still high in Pakistan, people move to private vehicles as soon as it is economically viable. This is usually due to public transport's sluggish image, inconsistency of service, lack of convenience and comfort, security issues, and perceived diminished status (NSDS, 2010).

Table A.2: Number of Motor Vehicles on Road (in 000 Nos.)

Calendar Year	1999-00	2004-05	2009-10	2012-13
Motorcycles/scooters	2,010.0	3,063.0	5,412.	5,550.0
Motor rickshaws	59.9	81.3	89.1	120.5
Motor cars	815.7	1,264.7	2,387.2	3,600.0
M.cab/Taxi	69.8	120.3	146.4	160.7
D. van	55.5	121.9	170.4	180.0
Pickup	61.6	87.6	130.3	150.2
Jeep	17.0	51.8	78.3	78.7
Station wagons	73.9	140.5	171.4	180.1
Ambulances	1.7	4.5	4.0	3.7
Buses	92.8	102.4	123.3	130.2
Trucks	127.4	151.8	200.5	220.5
Tractors	528.4	778.1	940.8	1128.7
Tankers (oil + water)	7.7	8.6	11.1	12.3
Others	78.8	69.4	21.8	60.5
Total	**3,997.2**	**6,048.3**	**9,866.4**	**11,576.1**

Adapted: GoP, 2013-14.

Proportion of Pakistan's rural population with: (a) motorable access is 91%; (b) all-weather motorable access is 85%; (c) paved access is 68%; and (d) bus/wagon stop within village is 69% (Pakistan Highways Rehabilitation Project, 2010). However, data for other modes and areas cannot be found.

Performance of Pakistan International Airlines Corporation (PIAC)

PIAC is facing various challenges during last some years like; ever increasing competition in the aviation market, fleet constraints along with the operational issues of the Corporation coupled with economic challenges facing the country and prevailing law & order situation. As shown in below table the number of plans are rapidly decreasing while the demand is increasing at the same rate because of the population and other needs increase, which leads to poor performance and service provision in Pakistan international Airlines.

Table A.3: PIAC performance

Year	Route (km.)	No. of plans	Available seat (million km.)	Available ton (million km.)	Passenger load factor (%)
2000	317,213	46	18,692	2,631	64.5
2005	354,644	42	20,348	3,033	67.0
2010	424,570	40	21,219	3091	74
2013	411,936	34	17,412	2471	70

Adapted: GoP, 2013-14.

Table A.4: Performance of Pakistan National Shipping Corporation (PNSC)

Fiscal Year	No of vessels	Ports Cargo Handled	Dead wt. (Tonnes)
1999-00	15	38,702	261,836
2004-05	14	48,052	570,466
2009-10	10	68,308.2	633,273
2012-13	9	64,074.4	642,207

Adapted: GoP, 2013-14.

Traffic accidents and its severity

The data is only available for road traffic accidents while the data for other transportation modes cannot be found anywhere.

Table A.5: Data on Traffic accidents

Year	Total number of accidents	Accidents		Persons		Total number of vehicles involved
		Fatal	Non-fatal	Killed	Injured	
2006-07	10466	4535	5931	5465	12875	11481
2009-10	9747	4378	5369	5280	11173	10496
2012-13	8988	3884	5104	4719	9710	9876

Adapted: GoP, 2011and 2014.

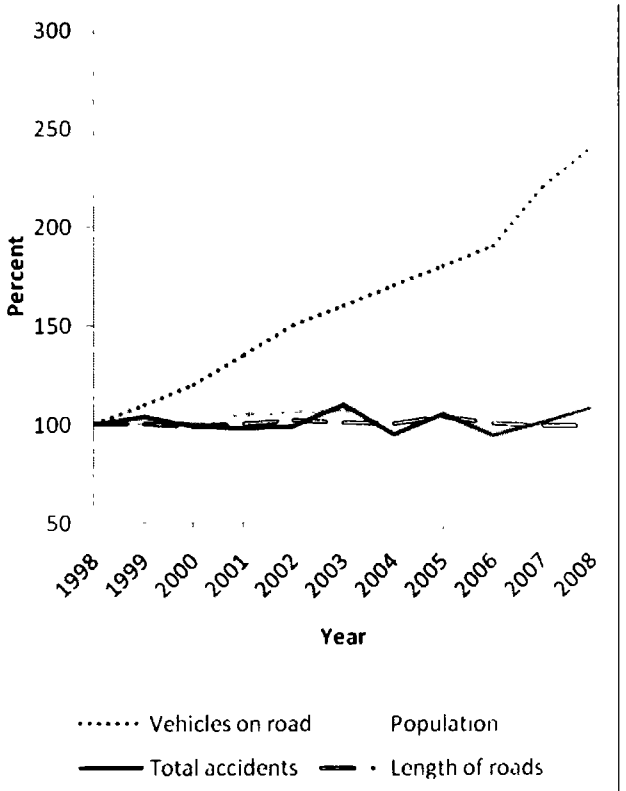

Figure A.1: Evolution of total Accidents, road length, vehicles on road, and population in Pakistan, 1998–2008
(Source: GoP, 2009).

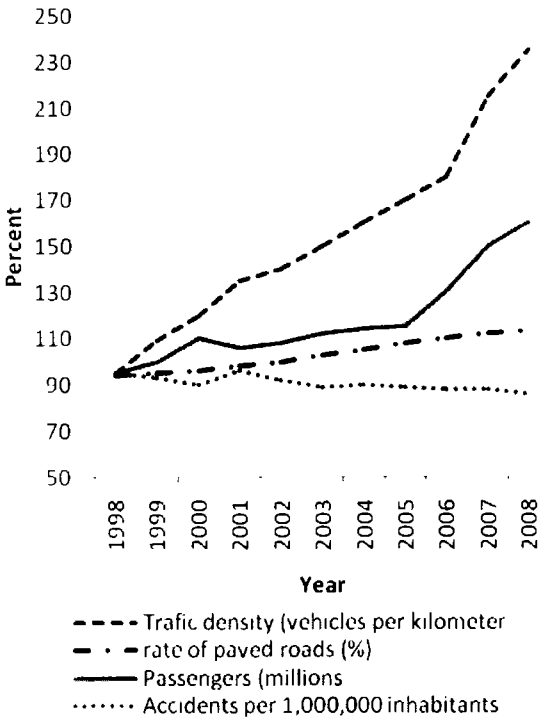

Figure A.2: Evolution of Accidents per inhabitant, rate of paved roads, traffic Density, and road passengersin Pakistan, 1998–2008 (Source: GoP, 2009).

Noise and vibration

Although some random surveys have been carried out in the last decade, there is no national monitoring system of environmental noise levels in cities. Table A.5 below presents the results of six surveys carried out between 2001 and 2003; the findings of these tests indicate that the noise levels in most urban locations are well above the WHO recommended limits. The National Environmental Quality Standards (NEQS) for Motor Vehicle Exhaust and Noise apply only to noise emanating from motor vehicles (85 db (A) at 7.5meters from the source), and there are no standards for noise generated from trains, airplanes, airports, or industrial/construction activities. Road traffic noise is a major source of noise pollution in urban areas in Pakistan.

A study carried out by the World Bank found that road traffic noise had a cost of Rs.25.8 billion in the province of Sindh. Road traffic noise in cities with a population of more than 100,000 in Sindh is the cause of 13–19 percent of ischemic heart disease mortality and 16–21 percent of cerebrovascular mortality in these cities. In addition, 31–43 percent of

children (6–15 years of age) have noise-induced cognitive impairment, and 10–13 percent of the population is highly sleep-disturbed as a result of noise in these cities. About 58 percent of the cost of road traffic noise is associated with morbidity, while the remaining 42 percent is caused by premature mortality (Pak-EPA, 2005).

Table A.6: Noise levels in major cities of pakistan.

City	Maximum recorded noise level dB (A)	Minimum recorded noise level dB (A)	Average
Gujranwala (2003)	100.0	41.0	72.5
Faisalabad (2003)	100.0	47.0	72.0
Islamabad (2002)	104.5	47.0	72.5
Rawalpindi (2002)	108.5	48.0	72.5
Karachi (2002)	88.9	62.4	72.5
Peshawar (2001)	78.5	62.2	86.0

Source: Pak-EPA, 2005.

Table A.7: Urbanization and migration rate in Pakistan

Year	2005	2010	2013
Total population	156.04mln	173.51mln	184.35mln
Urban population	53.92mln	64.09mln	71.07mln
Proportion of urban population	34.55%	36.94%	38.55%

Adapted: GoP, 2013-14.

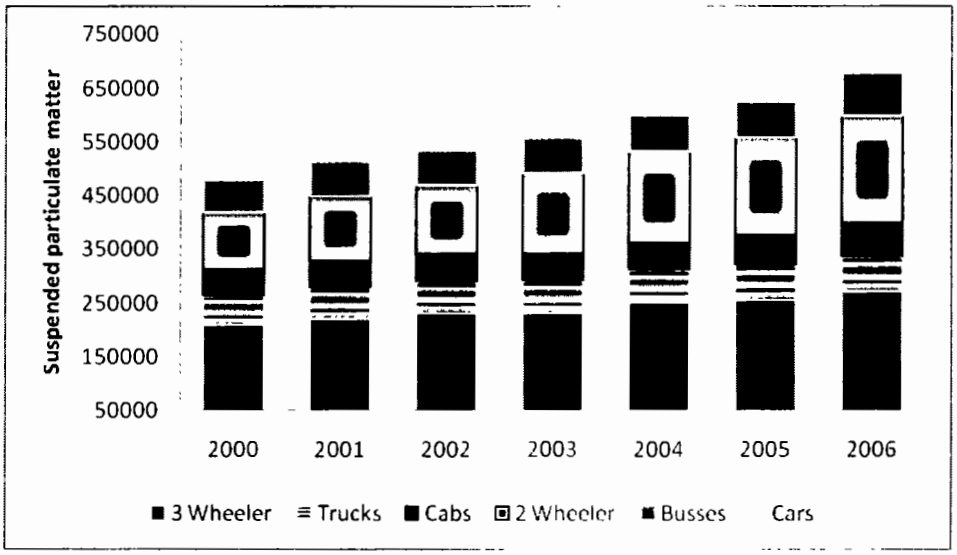

Figure A.3: Suspended particulate matter from vehicle Fleet
(Source: Sánchez-Triana *et al*; 2013).

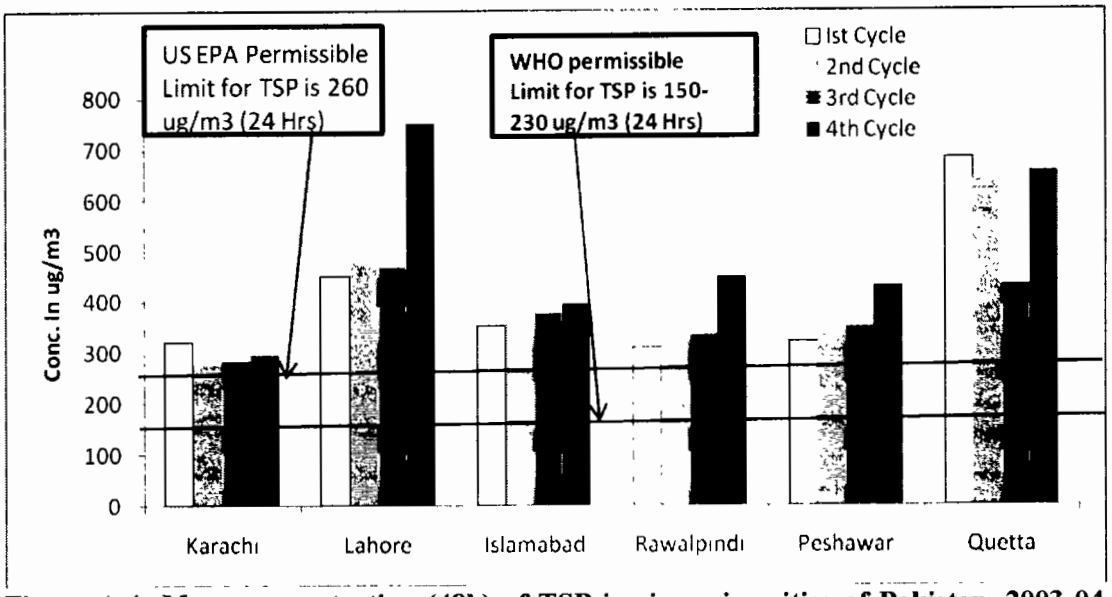

Figure A.4: Mean concentration (48h) of TSP in six major cities of Pakistan, 2003-04 (Source: Ghauri *et al*; 2007).

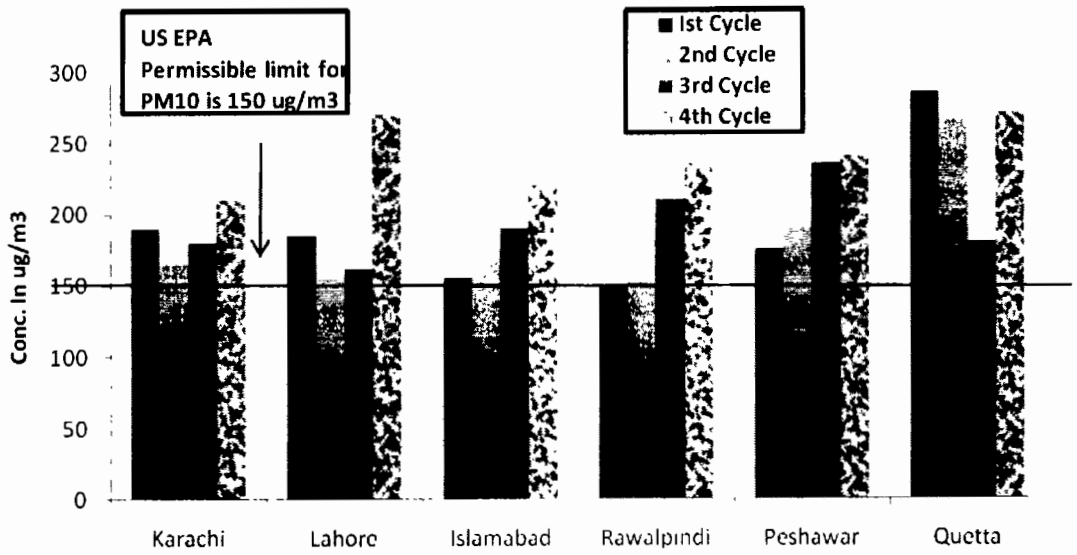

Figure A.5: Mean conc. of PM10 in six major cities of Pakistan, 2003-04 (Source: Ghauri *et al*; 2007).

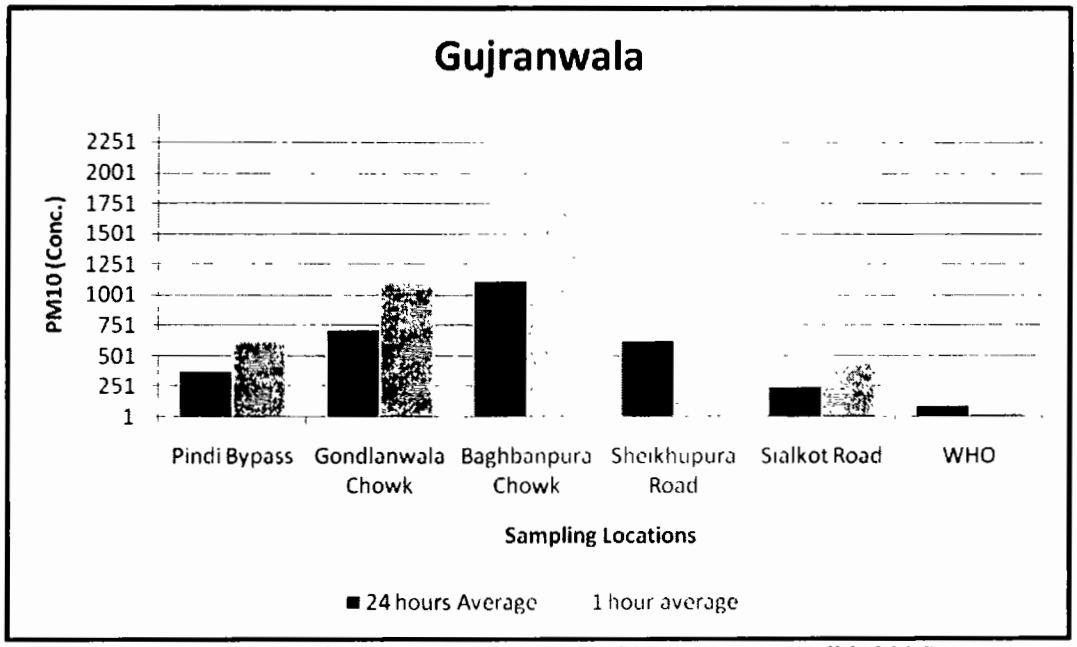

Figure A.6: Mean conc. of PM10 in Gujranwala, 2003 (Source: Lodhi, 2006).

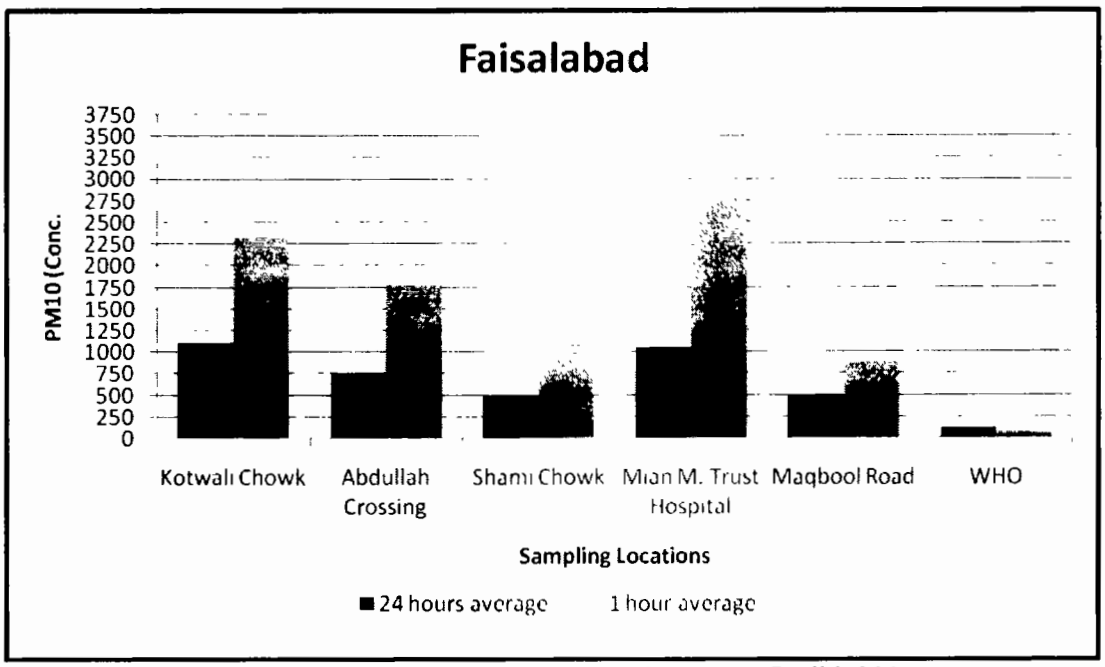

Figure A.7: Mean conc. of PM10 in Faisalabad, 2003 (Source: Lodhi, 2006).

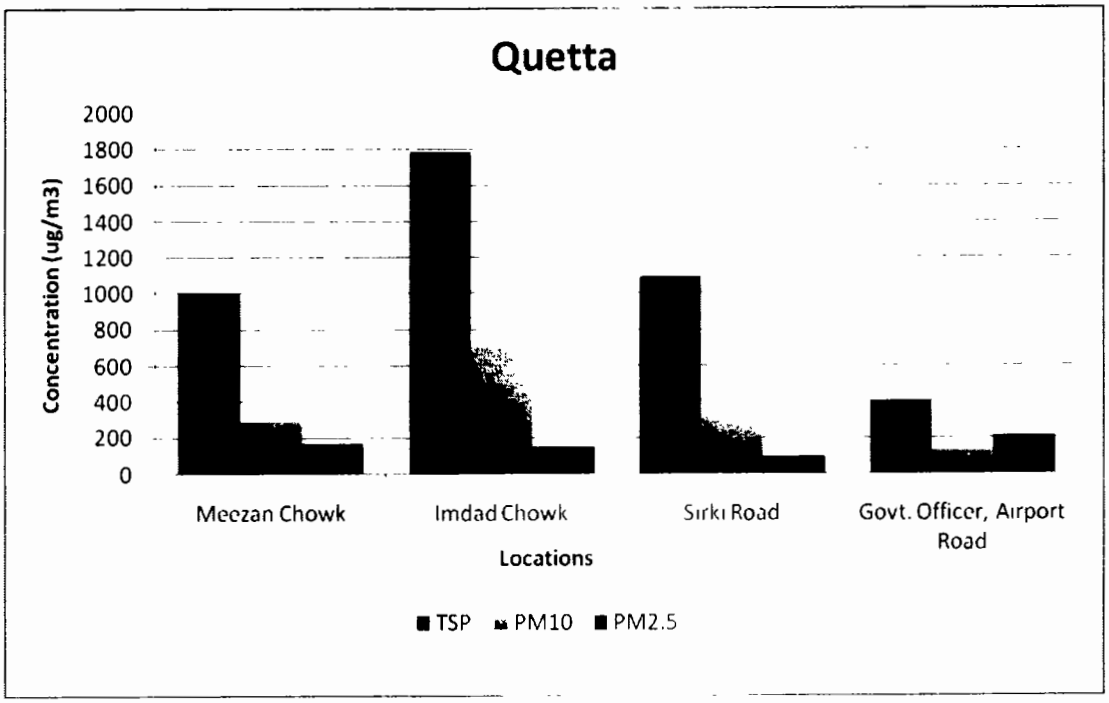

Figure A.8: TSP, PM10 AND PM2.5 concentrations at different sampling sites in Quetta (Source: Lodhi, 2006).

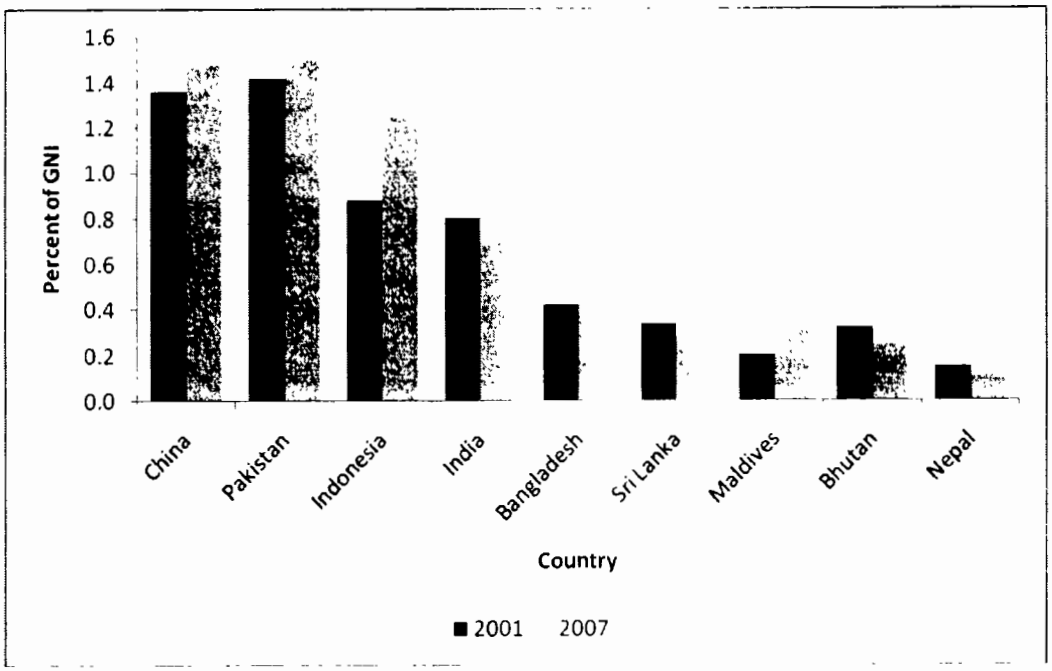

Figure A.9: Particulate emission damage in selected Asian countries, 2001 and 2007 (Source: CAI, 2010).

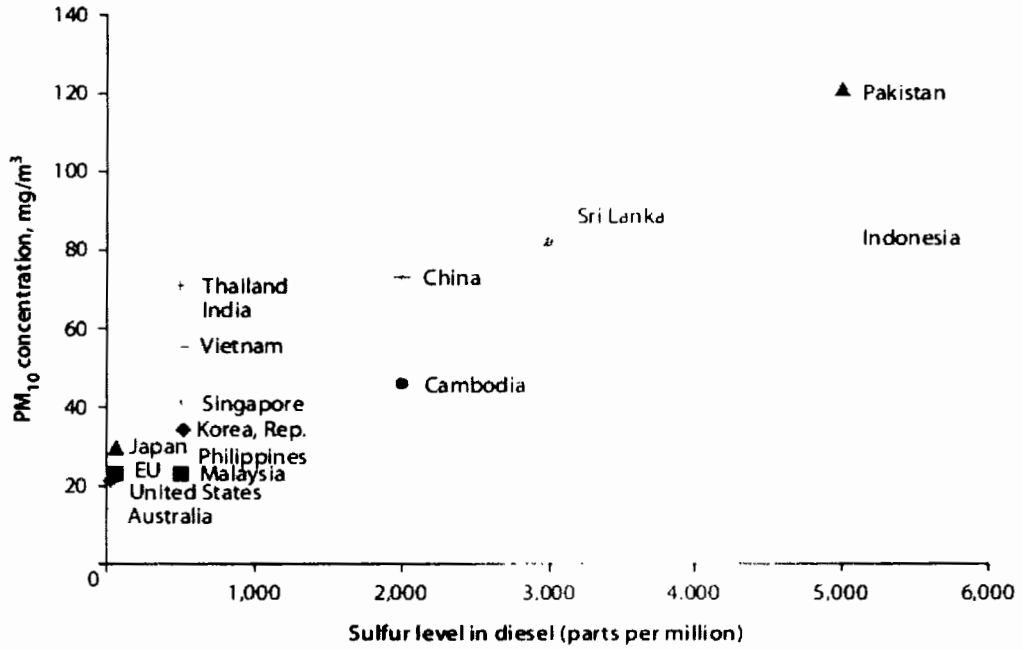

Figure A.10: Legally binding sulfur content in Diesel in selected countries and Average PM10 concentrations in urban centers, 2006 (Sources: CONCAWE, 2006).

Sulfure Dioxide (SO_2)

In 2000, hourly average SO_2 conc. at Lahore was 44.60ppb, at Rawalpindi was 30.70ppb and at Islamabad it was 28.50ppb (PakEPA/JICA, 2001).

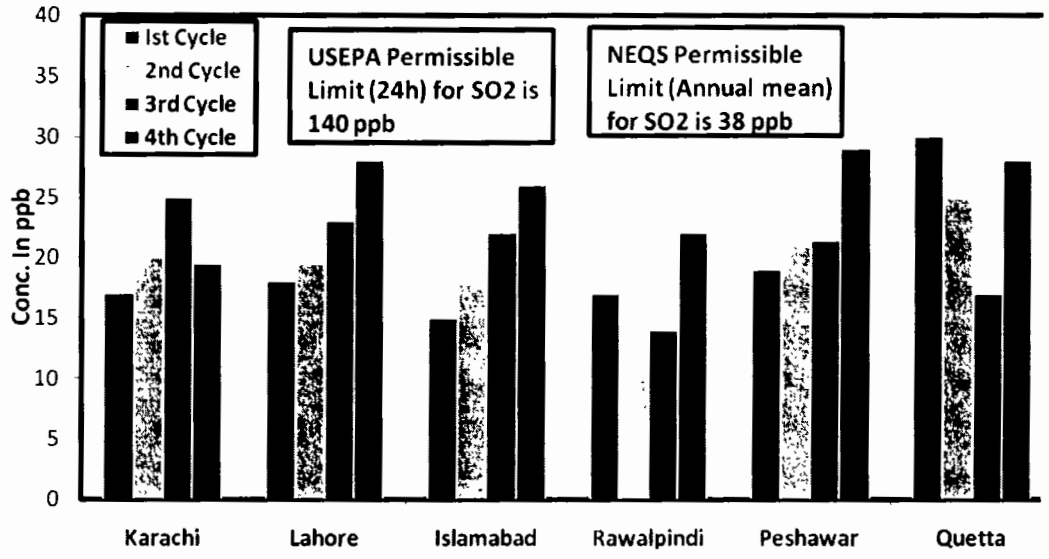

Figure A.11: Mean (48h) conc. of SO_2 in six major cities of Pakistan, 2003-04 (Source: Ghauri *et al*; 2007).

Carbon Monoxide (CO)

In 2000, hourly average COconc. at Lahore was 2.82ppm, at Rawalpindi was 1.83ppm and at Islamabad it was 1.55ppm (Pakistan EPA/JICA, 2001).

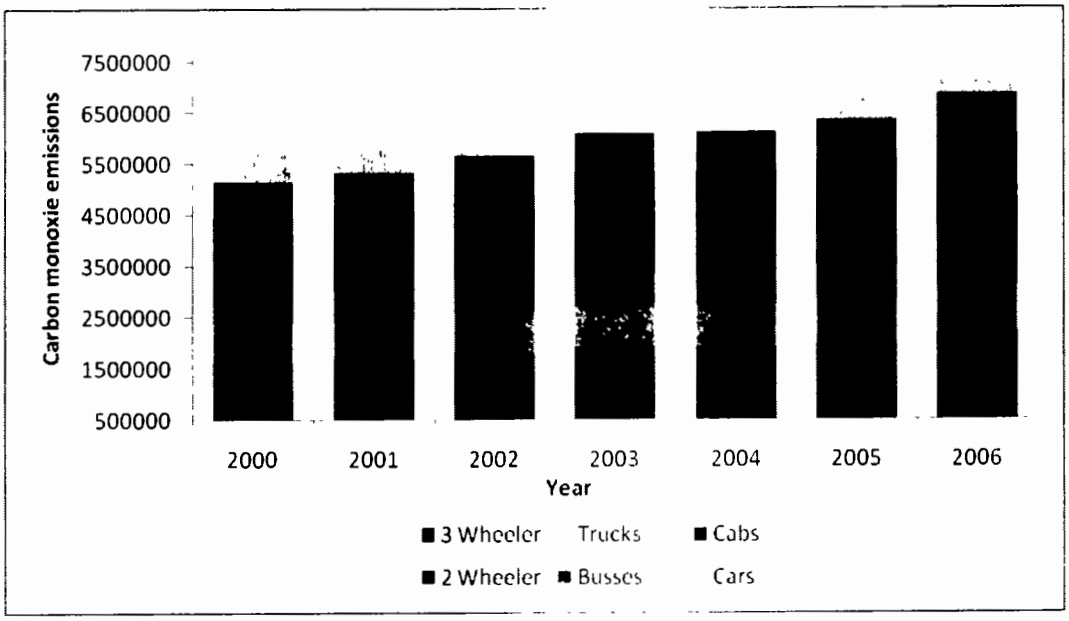

Figure A.12: Carbon monoxide (CO) emissions from vehicle Fleet ($mtCO_2$), 2000–06
(Source: Sánchez-Triana *et al*; 2013).

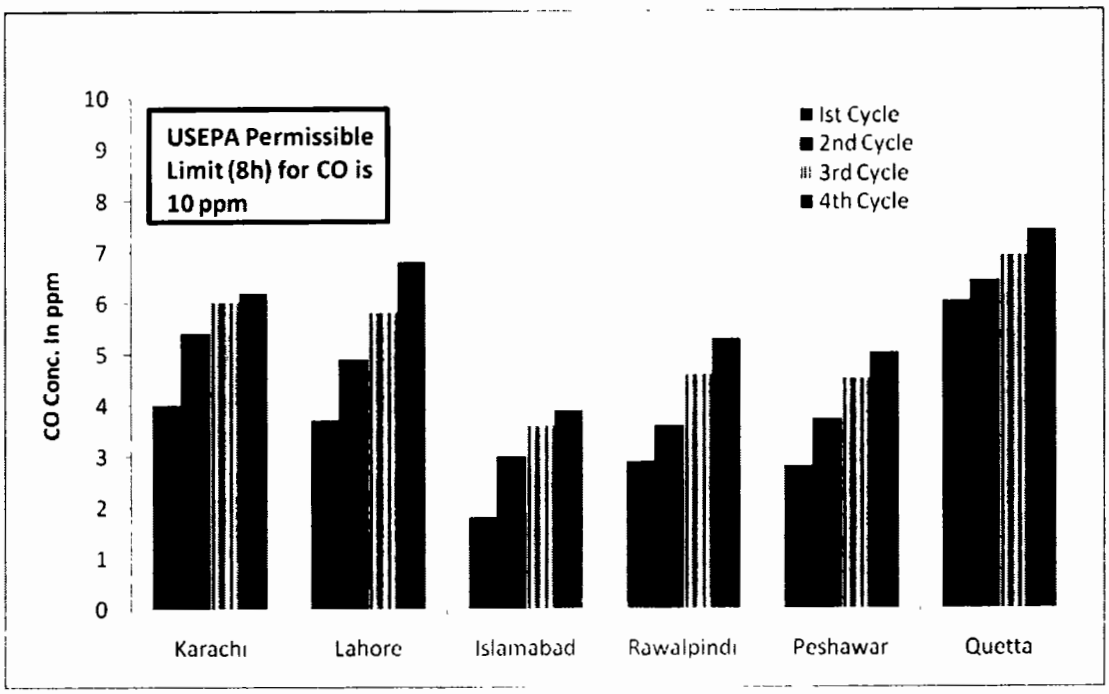

Figure A.13: Mean conc. of CO in six major cities of Pakistan, 2003-04
(Source: Ghauri *et al*; 2007).

Oxides of Nitrogen (NOx)

In 2000, hourly average NOx conc. at Lahore was 156.60ppb, at Rawalpindi was 74.70ppb and at Islamabad it was 148.50ppb (Pakistan EPA/JICA, 2001).

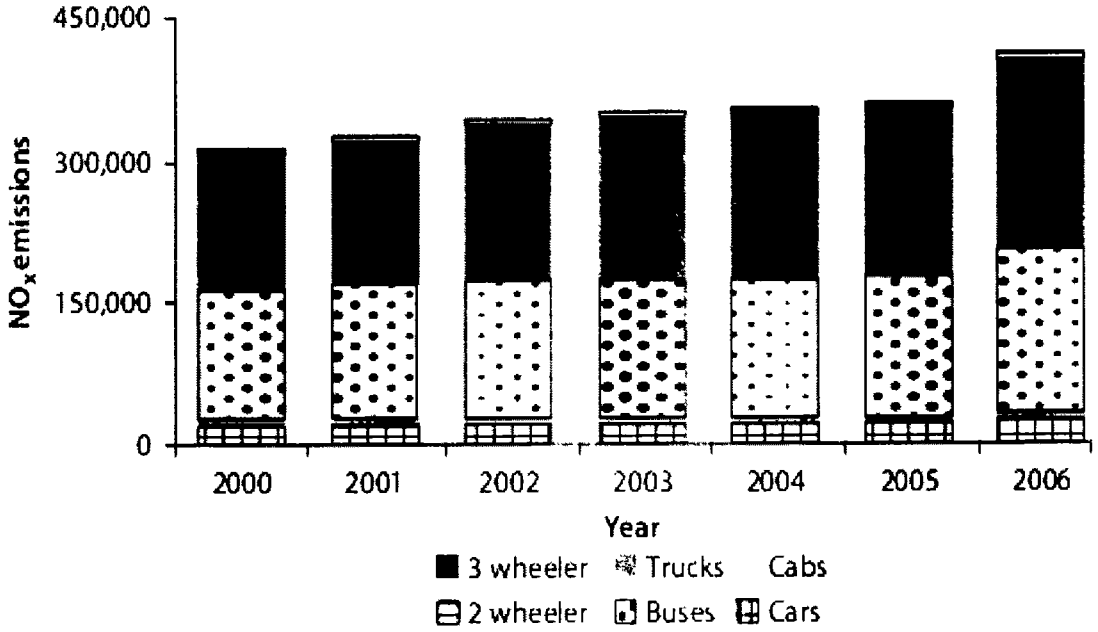

Figure A.14: NOx emissions from vehicle Fleet in Pakistan, 2000-06

(Source: Sánchez-Triana *et al*; 2013).

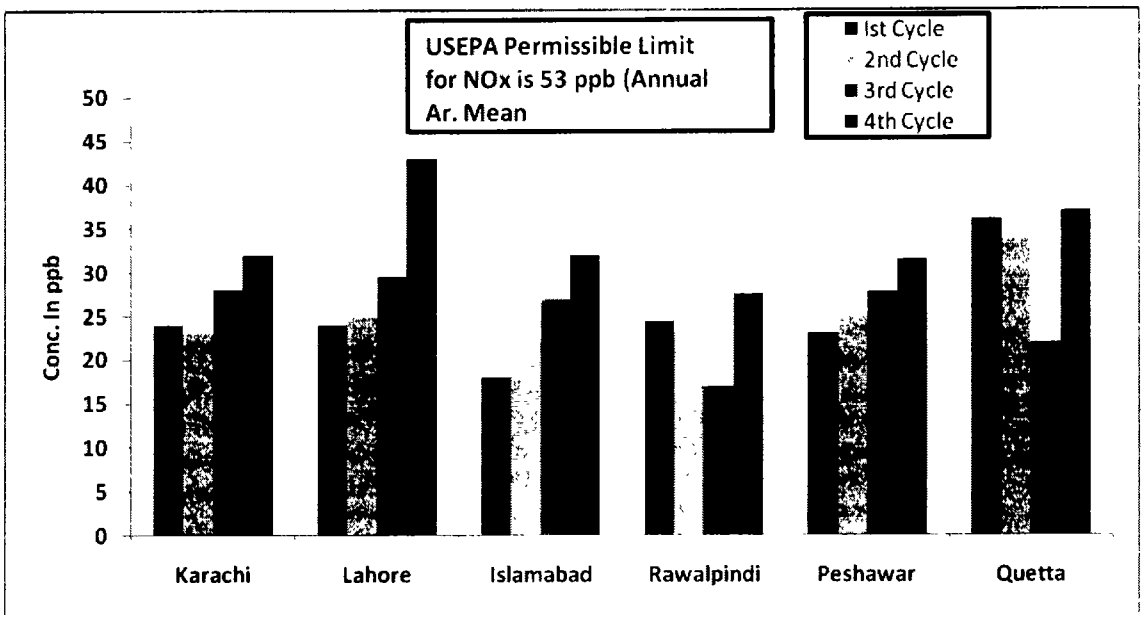

Figure A.15: Mean conc. of NOx in six major cities of Pakistan, 2003-04

(Source: Ghauri*et al*; 2007).

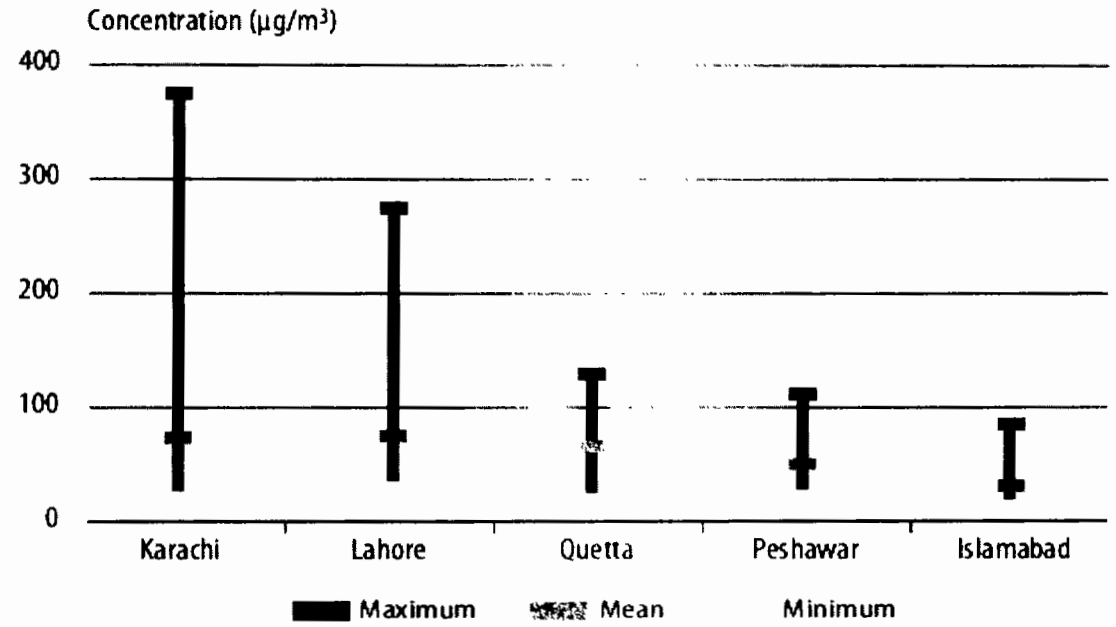

Figure A. 16: Nitrogen Dioxide (NO_2) Pollution level in major cities of Pakistan
(Source: Lodhi, 2006).

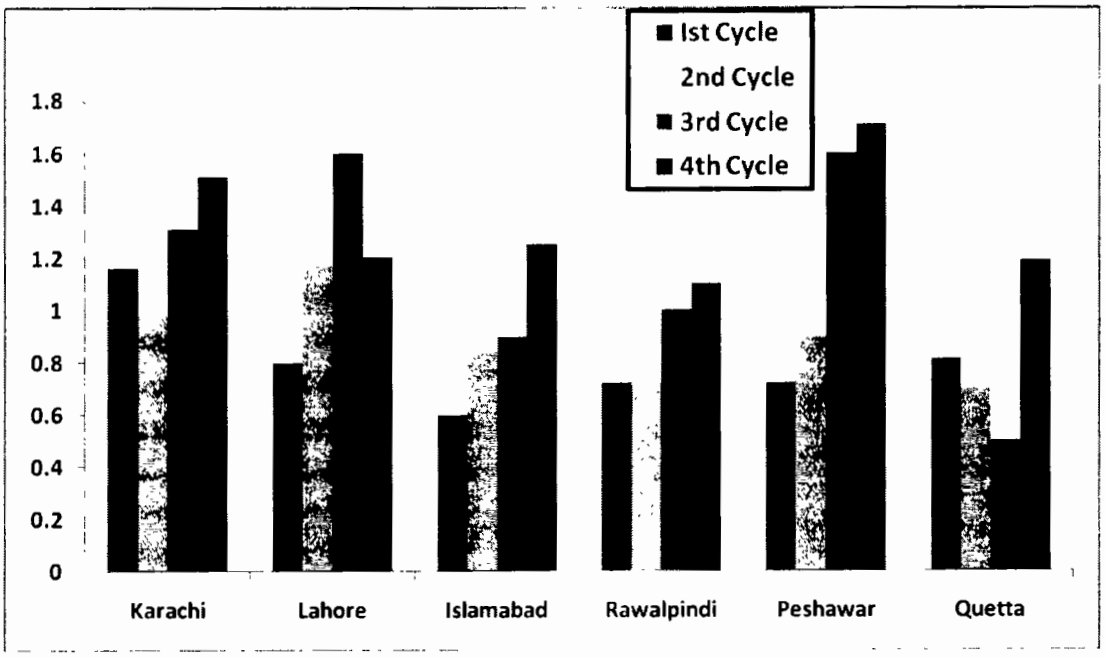

Figure A.17: Mean conc. of methane in six major cities of Pakistan 2003-04
(Source: Ghauri *et al*; 2007).

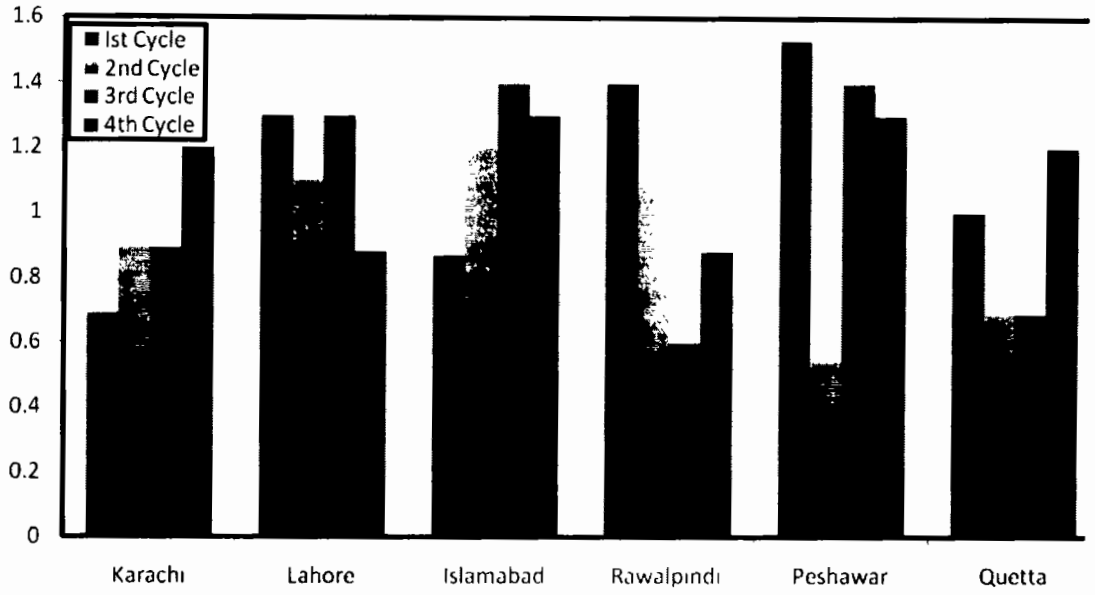

Figure A.18: Mean on non-methane in six major cities of Pakistan 2003-04 (Source: Ghauri *et al*; 2007).

OZON (O_3) level in major cities

In 2000, hourly average O_3 conc. at Lahore was 8.50ppb, at Rawalpindi was 17.00ppb and at Islamabad it was 10.00ppb (PakEPA/JICA, 2001).

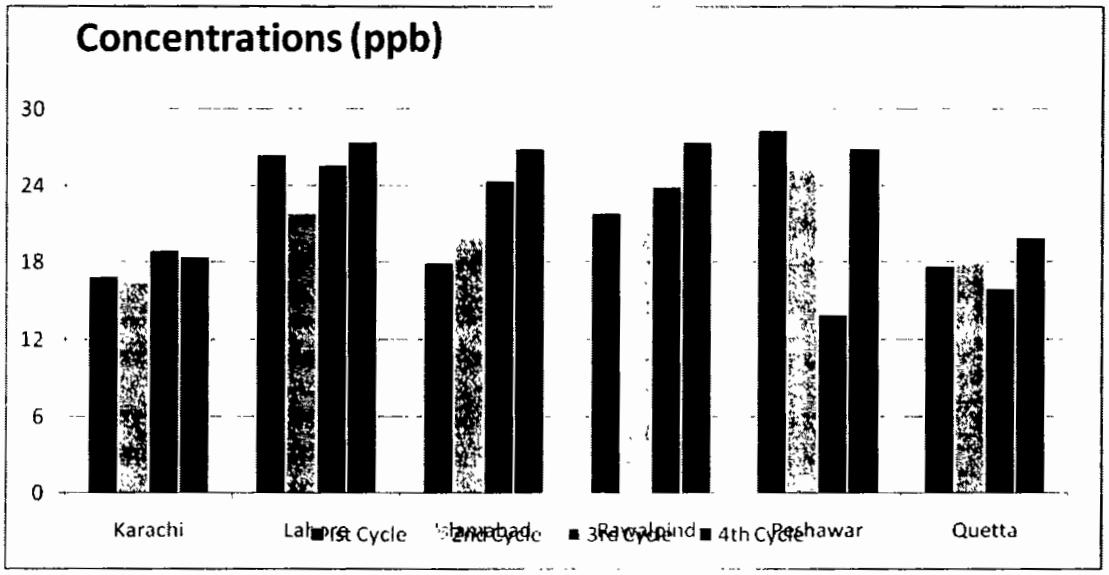

Figure A.19: Mean average concentration of ozone in six major cities of Pakistan, 2003-04 (Source: SUPARCO, 2005).

Table A.8: Renewable Energy potential (by type) in Pakistan

Technology	Current Achievement	Potential
Solar	0 MW Some Pilot Projects are installed	2.9 Million MW
Wind	0 MW Some Pilot projects are installed	200,000 MW +
Hydro	6440 MW	46,000 MW
Biologically derived energy	Being used but not on a significant scale	4,000 MW
Geothermal	Pilot Project is installed	80,000 MW

Source: NEEDS, 2011.

Table A.9: Water quality status in Pakistan

Year	Baluchistan				Punjab				Khyber Pakhtunkhwa				Sindh			
	Safe		**Unsafe**		**Safe**		**Unsafe**		**Safe**		**Unsafe**		**Safe**		**Unsafe**	
	No	%	No	%	No	%	No	%	No	%	No	%	No.	%	No	%
2002	10	15	55	85	17	12	123	88	8	23	27	77	12	22	43	78
2003	12	18	54	82	13	9	126	91	12	34	22	65	4	7	51	93
2004	15	23	51	77	13	8	150	92	5	14	30	86	2	4	53	96
2005	14	23	48	77	16	10	147	90	8	17	38	83	6	11	49	89
2006	11	17	55	83	17	10	146	90	11	24	35	76	5	9	50	91

Source: PCRWR, 2008.

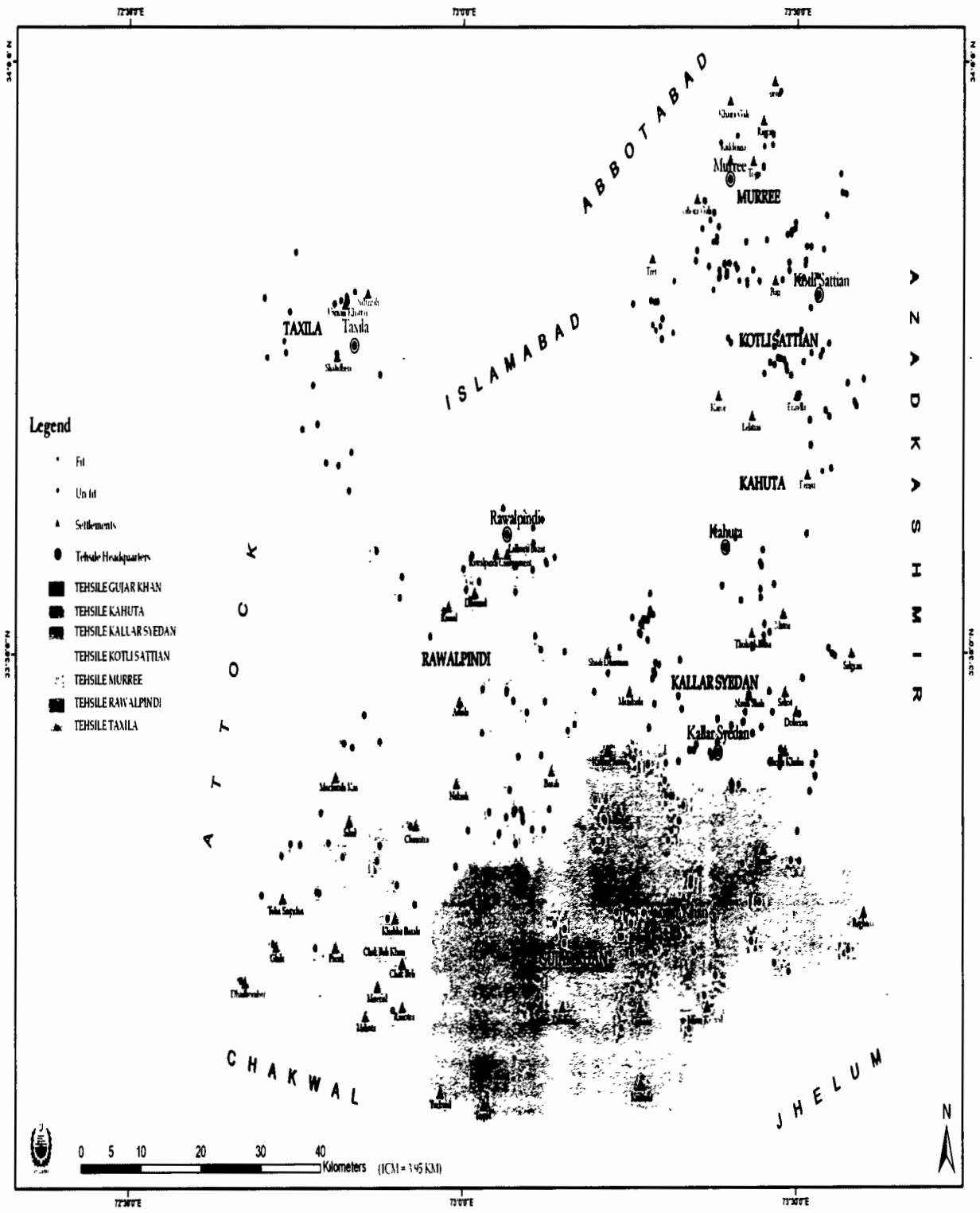

Figure A.20: Ground Water Quality in Pakistan (Source: PCRWR, 2008)

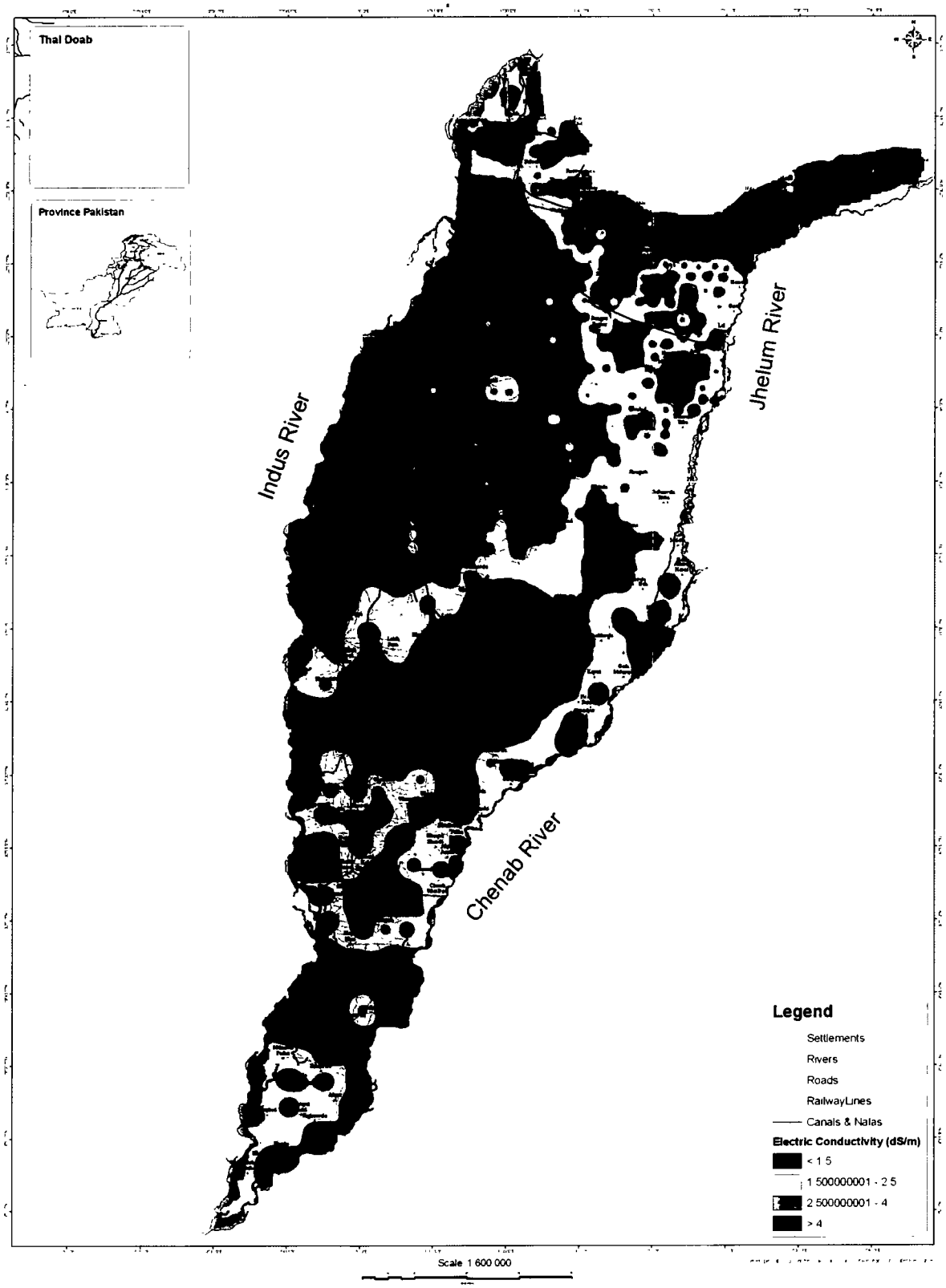

Figure A.21: Water Quality Zonation and Electric conductivity level (ds/m) in Pakistan (at 0-50m depth) (Source: PCRWR, 2008)

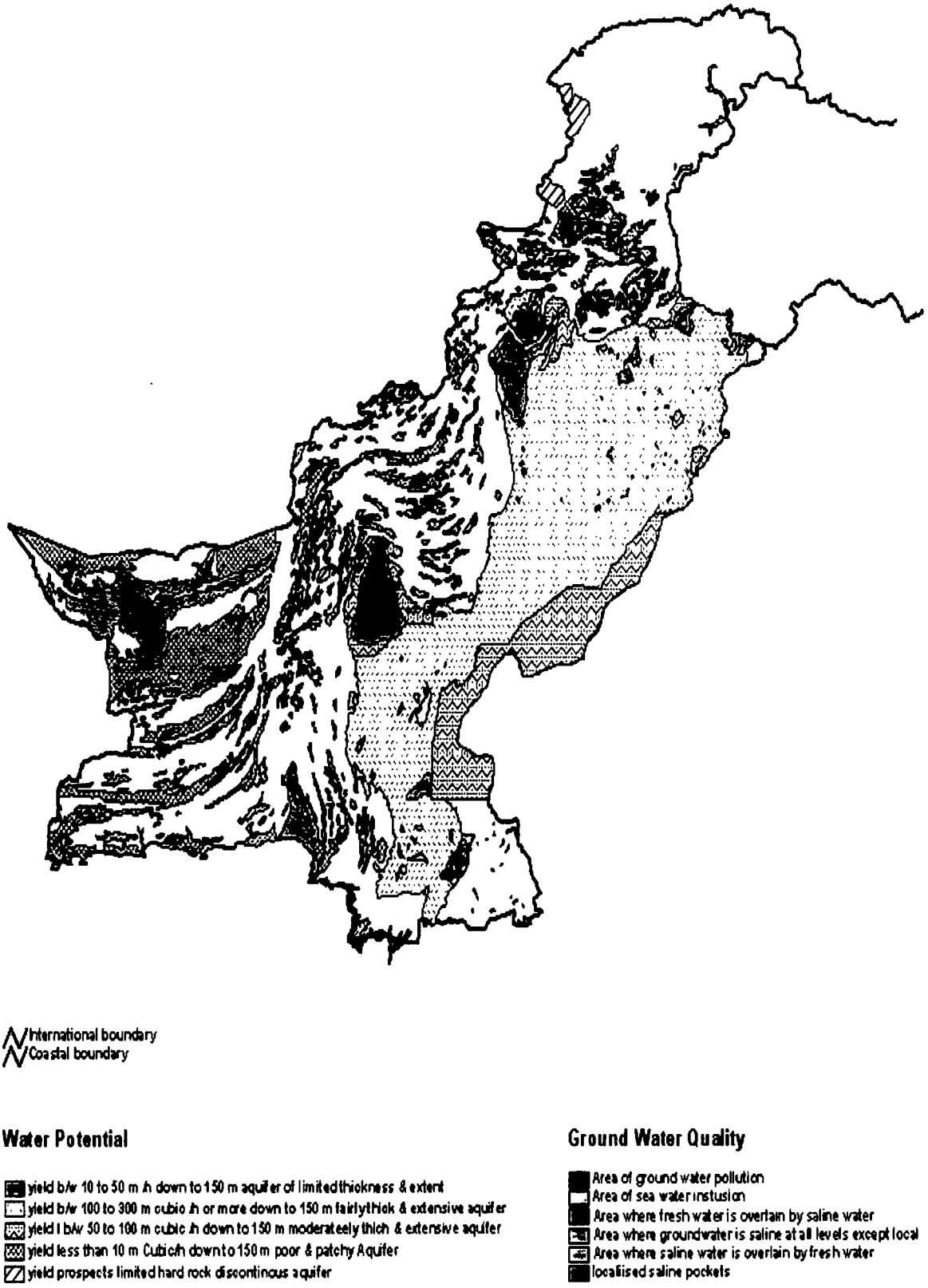

Figure A.22: Ground Water Quality and Water Potential of Pakistan
(Source: GoP, 2009)

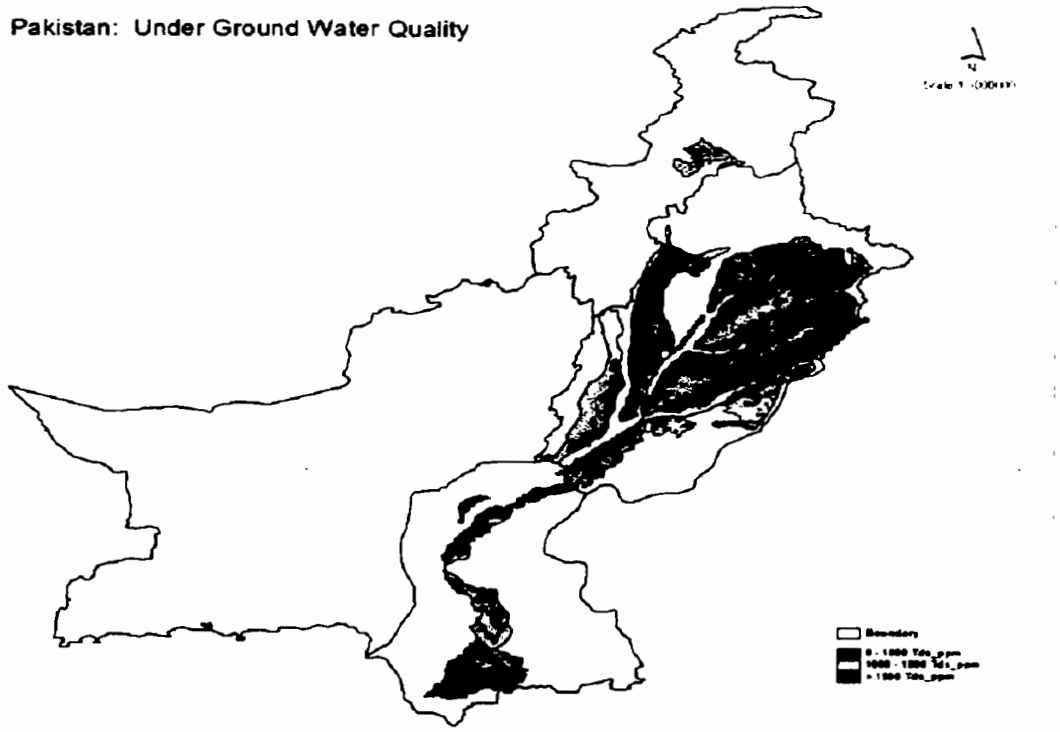

Figure A.23: TDS level in underground water of Pakistan, 2001-03 (Source: GoP, 2009)

Table A.10: TDS level in underground water of Pakistan

Zone Name	Area Surveyed	Shallow Water Quality Based on of TDS (ppm)					
		Usable (<1000)		Marginal (1000-1500)		Hazardous (>1500)	
		Area	%	Area	%	Area	%
NWFP							
Swat	0.715	0.715	100	0	0	0	0
Kabul River	0.273	0.265	97.07	0.008	2.93	0	0
Total	0.988	0.98	99.19	0.008	0.81	0	0
PUNJAB							
Thal Doab	3.977	2.627	66.05	0.567	14.26	0.783	19.69
Chaj Doab	2.474	1.624	65.64	0.49	19.81	0.36	14.55
Rechna Doab	5.729	3.245	56.64	1.095	19.11	1.389	24.25
Bari Doab	4.299	2.77	64.60	0.76`	17.72	0.758	17.68
Fordwah Zone	2.524	0.718	18.33	0.336	13.26	1.48	58.41
Punjnad Zone	1.644	0.986	59.98	0.161	9.79	0.497	30.23
D.G. Khan Zone	0.957	0.37	38.66	0.214	22.36	0.373	38.98
Total	21.603	12.34	57.12	3.623	16.77	5.64	26.11
SINDH / BALUCHISTAN							
Gaddu Left Zone	0.566	0.492	86.92	0.063	11.14	0.011	1.94
Gaddu Right Zone	0.222	0.197	88.72	0.025	11.28	0	0
Sukkur Left Zone	2.81	0.784	27.90	1.497	53.27	0.529	18.83
Kotri Left Zone	2.786	0.577	20.69	0.454	16.25	1.757	63.06
Kotri Right Zone	0.717	0		0		0.717	100
Total	**7.101**	**2.05**	**20.86**	**2.039**	**28.70**	**3.014**	**42.44**

Source: GoP, 2009

Table A.11: Critically Threatened Ecosystems of Pakistan

	Ecosystem	Characteristics	Significance	Threats
1	**Indus delta and coastal wetlands**	Extensive mangroves and mudflats, Inadequate protected area coverage	Rich avian and marine fauna Diverse mangrove habitat Marine turtle habitat	Reduced freshwater flow from diversions upstream Cutting mangroves for fuelwood Drainage of coastal wetlands
2	**Indus river and wetlands**	Extensive wetlands	Migratory flyway of global importance Habitat for Indus river dolphin	Water diversion/drainage Agricultural intensification Toxic pollutants
3	**Chagai desert**	A desert of great antiquity	Many endemic and unique species	Proposed mining Hunting parties from the Gulf
4	**Balochistan juniper forest**	Huge and ancient junipers	Largest remaining juniper forest in the world with Unique flora and fauna	Fuelwood cutting & overgrazing Habitat fragmentation
5	**Chilghoza forest (Suleiman Range)**	Rock outcrops with shallow mountain soils	Important wildlife habitat for several species at risk	Fuelwood cutting & overgrazing Illegal hunting
6	**Balochistan subtropical forests**	Mid-altitude forests with sparse canopy but rich associated flora	Very few areas now remain Important wildlife habitat	Fuelwood cutting & overgrazing
7	**Balochistan rivers**	Not connected with the Indus River System	Unique aquatic fauna and flora with high levels of endemism	Water diversion/drainage Overfishing
8	**Tropical deciduous forests (Himalayan foothills)**	Extend from the Margalla Hills NP east to Azad Kashmir	Perhaps the most floristically rich ecosystems of Pakistan	Fuelwood cutting & overgrazing
9	**Moist and dry temperate Himalayan forests**	Important forest tracts now becoming increasingly fragmented	Global hotspot for avian diversity; important wildlife habitat	Commercial logging Fuelwood cutting & overgrazing
10	**Trans-Himalayan alps and plateaux**	Spectacular mountain scenery	Unique flora and fauna; center of endemism	Fuel wood cutting and overgrazing Illegal hunting Unregulated tourism Habitat fragmentation

Source: BAP, 1999

Table A.12: Waste Generation Rate and amount in major cities of Pakistan.

City	Generation rate (Kg/Capita/Day)	Waste Generation (Tons/Day)
2002		
Karachi	0.613	6,450.0
Peshawar	0.489	809.3
Bannu	0.439	36.0
Quetta	1.000	750.0
Sibbi	0.570	37.0
2009		
Gujranwala	0.469	824.0
Faisalabad	0.48	1170
Lahore	0.700	6,720
Bahawalpur	0.50	253
Hyderabad		200.0

Source: GoP, 2010.

Citation

BAP (Biodiversity Action Plan for Pakistan), (1999).

CAI (Clean Air Initiative), (2010). See, for example, "Clean Air Initiative for Asian Cities (CAI-Asia)". http://www.aecen.org/sites/default/files/forums/2010/CAI%20Asia-%20GOZUN.pdf

CONCAWE (Conservation of Clean Air and Water in Europe), (2006). "Motor Vehicle Emission Regulations and Fuel Specifications—Part 2: Historic Review (1996–2005)." Boulevard du Souverain 165, B-1160, Brussels, Belgium.

Ghauri, B., Lodhi, A., & Mansha, M. (2007). Development of baseline (air quality) data in Pakistan. *Environmental Monitoring and Assessment*, **127**(1-3).

GoP (Government of Pakistan), (2009). "Labor Force Survey 2008–09." Federal Bureau of Statistics. Islamabad.

GoP (Government of Pakistan). 2009. Land use atlas of Pakistan. Ministry of Environment. http://apps.unep.org/publications/pmtdocuments/-Land_Use_Atlas_of_Pakistan-2009Pakistan_LandUseAtlas_2009.pdf.pdf

GoP (Government of Pakistan), (2010). Compendium on Environment, Federal Bureau of Statistics. http://www.pbs.gov.pk/sites/default/files/crops_and_climates/compendium_environment/compendium_enrironment_2010.pdf

GoP (Government of Pakistan), (2011, 2014). Monthly bulletin of statistics. Pakistan Bureau of Statistics, Islamabad. http://www.pbs.gov.pk/search/node/bulletin%20of%20statistics

GoP (Government of Pakistan), (2013-14). Pakistan Economic Survey. Ministry of Finance. http://www.finance.gov.pk/survey_1314.html

NEEDS (National Environmental and Economic Development Strategy). Government of Pakistan.

NSDS (National Sustainable Development Strategy), (2012). Government of Pakistan.

Pak-EPA (Pakistan Environmental Protection Agency). (2005). "Position Paper for Environmental Quality Standards of Noise in Pakistan." Islamabad.

Pak-EPA/JICA (2006). Measurement of NO2 Concentration in Ambient Air in Major Cities of Pakistan Using Diffusion Samplers. .http://www.environment.gov.pk/news.htm#Measurement%20Of%20No2%20Concentration%20In%20Ambient%20Air%20In%20Islamabad%20Using%20Diffusion%20Samplers

Pak-EPA (Pakistan Environmental Protection Agency), (2009). Land use atlas of Pakistan. Ministry of Environment.

PCRWR (Pakistan Council of Research in Water Resources), (2008). Annual Report, Part 2. http://www.pcrwr.gov.pk/Annual%20Reports/New% 20Annual%20Repot%202005-06_2.pdf

PHRP (Pakistan Highways Rehabilitation Project), (2010). Project ID, P010556. Report No, AB2170. National Highway Authority. Government of Pakistan.

Sánchez-Triana, E., Afzal, J., Biller, D., & Malik, S. (2013). Greening Growth in Pakistan through Transport Sector Reforms. The World Bank.

SUPARCO (Space and Upper Atmosphere Research Commission), (2005). Materials on Ambient Air Quality in Major Cities of Pakistan

Zulifikar H. Lodhi. (2006). Ambient Air Quality in Pakistan. Pak-EPA http://www.environment.gov.pk/PRO_PDF/AmbientAirQtyPakistan.pdf

SORCES OF BASLINE INFORMATION

The references and sources of information that had been highlighted by numbering in baseline information (Table 4.2) are presented below. However, the references in Appendix A also provide many sources of the relevant information which can be used for monitoring purpose. Local, regional and country level monitoring sites are also very useful sources for additional information.

Ref. No.	Source of baseline information	Example of information
[1]	World bank data for Pakistan, world development indicators (excel data sheet). http://data.worldbank.org/country/pakistan	- Total Population of Pakistan during 1960–2013, row 1240 - Employment to population ratio during 1991-2013, row 1107. - Data for different air pollutants - Data for different indicators about energy and climate change. - Road density in Pakistan row 629.
[2]	Pakistan economic survey 2013-14, Ministry of Finance, Government of Pakistan http://www.finance.gov.pk/survey_1314.html	- Population of Pakistan in 2030 by age groups, chapter 12, page 157, Table 12.2 - Trend in fertility rate, page 157, fig 2 - Employment and unemployment rate, chapter 12. - Achievement of Millennium development targets (7) for sulfur content in high speed diesel in 2013-14. chapter 16, Environment, Table 16.1, page 246. - %age increase in the number of motorcycles and rickshaws on the road during 2001-13. chapter 16, Environment, Table 16.2, page 249. - Number of motor vehicles (LCV and HCV) on road during 1991-2013. Statistical appendix of transport and communication, table 13.4. - Achievement of Millennium development targets (7) for forest covers and protected areas for wildlife conservation in 2013-14. Chapter 16, table 16.1, page 246.
[3]	Pakistan Employment Trends 2013, Bureau of Statistics, Statistics Division Pakistan, Government of	- Employment to population ratio in Pakistan, south Asia and east Asia, table 3, page 9.

	Pakistan. http://www.pbs.gov.pk/sites/default/files/Labour%20Force/publications/Pakistan_Employment_2013.pdf	
[4]	Pakistan Bureau of Statistics. Government of Pakistan http://www.pbs.gov.pk/sites/default/files//tables/Table%207.pdf	- Sectoral Shares in GDP (at constant basic prices), Table 7. - Monthly wise data on visits to archeological museums and heritage sites during 2008-14.
[5]	Sánchez-Triana, E., Afzal, J., Biller, D., & Malik, S. (2013). Greening Growth in Pakistan through Transport Sector Reforms. The World Bank. doi:10.1596/978-0-8213-9929-3 http://econ.worldbank.org/external/default/main?pagePK=64165259&theSitePK=477894&piPK=64165421&menuPK=64166093&entityID=000445729_20130704143439	- Noise levels in major cities of Pakistan, table 5.4, page 91. - Road traffic Deaths, in south Asia in 2007, table 5.5, page 93. - SPM, CO and NO_x Emissions from different type of Vehicles, 2000–06, page 85-86. - Challenges and issues associated with transport sector of Pakistan. - Environmental performance ranking of Pakistan in the world, page 87. - Status of Pakistan in 2001 and 2007 for particulate emission damage in selected Asian countries, page 90.
[6]	WHO (World Health Organization). 2009. Global Status Report on Road Safety: Time for Action. Geneva: WHO. http://whqlibdoc.who.int/publications/2009/9789241563840eng.pdf.	- Pakistan status on Road Safety
[7]	National Environmental Quality Standards for Ambient Air, water and noise, 2010. Ministry of environment, Government of Pakistan. http://environment.gov.pk/NEQS/SRO-2010-NEQS%20Air-Water-Noise.pdf	- National Environmental Quality Standards for Ambient Air, water and noise
[8]	Asian Development Bank and the Clean Air Initiative for Asian Cities (CAI-Asia). (2006). Country Synthesis Report on Urban Air Quality Management, Pakistan. https://www.google.com.pk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0CCIQFjAB	- Hourly Average Ambient Concentrations of PM_{10}, SO_2, CO, NO_x and O_3 in Lahore, Rawalpindi and Islamabad in 2000, page 5. - 48 hours averaged data in 2003-04 for PM_{10}, SO_2, CO, NO_x, and O_3 in Karachi, Lahore, Peshawar, Quetta, Rawalpindi, and Islamabad, page 6-7.

	&url=http%3A%2F%2Fcleanairinitiative.org%2Fportal%2Fsystem%2Ffiles%2Fdocuments%2Fpakistan_0.pdf&ei=fTbbVI_JI9HbapmXgJgF&usg=AFQjCNGzVOIIhiUD68ckdRSrk3jBJTiWaw&sig2=mSL59jpZrINT1BTMl_bjeQ&bvm=bv.85761416,d.d2s	- Proposed Measures to Address Air Pollution in Pakistan, age 10.
[9]	Zulifikar H. Lodhi. 2006. Ambient Air Quality in Pakistan. Pak-EPA http://www.environment.gov.pk/PRO_PDF/AmbientAirQtyPakistan.pdf	- PM_{10} 1hr and 24hr averages for Gujranwala and Faisalabad, page 2. - TSP, PM_{10} and $PM_{2.5}$ concentrations in Quetta page 3. - NO_2 ambient level in Karachi, Lahore, Peshawar, Quetta and Islamabad, page 4
[10]	Colbeck, I., Nasir, Z. A., & Ali, Z. (2010). The state of ambient air quality in Pakistan--a review. *Environmental Science and Pollution Research International*, **17**(1). http://link.springer.com/article/10.1007%2Fs11356-009-0217-2	- Reviews the data being available on the criteria air pollutants such as PM, SO_2, O_3, CO, NO_2 and Pb for the time period of 1978-2009 and compares these data with WHO air quality guidelines.
[11]	Pope, C. Arden, III, and Douglas W. Dockery. 2006. "Health Effects of Fine Air Pollution: Lines that Connect." *Air & Waste Management Association* **56**(1). http://www.noaca.org/pmhealtheffects.pdf.	- Health effects of Particulate Matter in Pakistan.
[12]	National Environmental Quality Standards for Ambient Air Pollutants, Pak-EPA. Government of Pakistan.	- Time-weighted average Environmental Quality Standards for Ambient Air Pollutants in the country in 2009 and 2012 onward.
[13]	Pakistan Millennium Development Goals Report. (2013). Ministry of Planning, Development and Reform. Government of Pakistan. http://pc.gov.pk/PMDGR-2013/Paskistan%20MDGR2013.pdf	- Achievement of Millennium development targets (7) for sulfur content in high speed diesel in 1990-2012. Table 28, page 93. - Achievement of Millennium development targets (7) for forest covers and protected areas for wildlife conservation in 1990-2012. Table 28, page 93.
[14]	Khwaja, M. A., & Khan, S. R. (2005). Air Pollution: Key Environmental Issues in Pakistan. http://www.sdpi.org/publications/files/A-99.pdf	- Estimated air pollutants from various economic sectors. Table 3,page 6.

[15]	Pakistan's Initial National Communication on Climate Change. (2003). Ministry of Environment, Islamabad-Pakistan. http://unfccc.int/resource/docs/natc/paknc1.pdf	- Summary Report for National Greenhouse Gas Inventories 1994, page 38. - Summary Report for National Greenhouse Gas Inventories 1994, page 38.
[16]	Compendium on Environment. (2010). Federal bureau of Statistics, Government of Pakistan. http://www.pbs.gov.pk/sites/default/files/crops_and_climates/compendium_environment/compendium_enrironment_2010.pdf	- Summary Report for National Greenhouse Gases in 2008, page 120. - Summary Report for National Greenhouse Gases in 2008, page 120.
[17]	Ghauri, B., Lodhi, A., & Mansha, M. (2007). Development of baseline (air quality) data in Pakistan. *Environmental Monitoring and Assessment*, **127**(1-3). http://link.springer.com/article/10.1007/s10661-006-9276-8	- 2003-04, 48hr mean concentration data for SPM, PM10, SO2, CO, CO2, O3, NOx, Pb, Hydrocarbons (Methane and Non-Methane), and noise as well as meteorological parameters in Karachi, Lahore, Quetta, Rawalpindi, Islamabad and Peshawar
[18]	World Bank (2006). Pakistan Strategic Country Environmental Assessment. Vol II. Report, NO.36946-PK. Environmental and Social Development Unit. South Asia1818h Street, Washington DC, 20433, USA. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2006/10/02/000160016_20061002114308/Rendered/PDF/3694610vol1021PK.pdf	- Estimated PM_{10} Average Annual Concentration in different (44) cities of Pakistan according to population of 2004. Estimated mortality and morbidity effects and its cost, due to urban air pollution.
[19]	Pakistan Energy year book, (2012). Hydrocarbon Development Institute of Pakistan, Ministry of Petroleum and Natural Resources	- Energy consumption by transport sector in Pakistan. Table 1.5.5. page 7.
[20]	Task force on climate change, (2010). Ministry of planning commission, Islamabad-Pakistan http://pc.gov.pk/usefull%20links/Taskforces/TFCC%20Final%20Report.pdf	- Pakistan comparison with different countries for CO_2 emissions and energy consumption. Table 3.1 - National greenhouse gas inventory 2008, page - temperature and precipitation in Pakistan
[21]	Annual reports, 2007-14. National Disaster Management Authority (NDMA). Government of Pakistan http://www.ndma.gov.pk/BooksPublic	- Damages done due to floods in Pakistan during 2008-14.

	ations.php	
[22]	Vision, 2030. Planning Commission, Government of Pakistan.	- Current energy generation capacity from renewable source and future targets for energy generation from renewable sources.
[23]	National Sustainable Development Strategy (NSDS), 2012	- Water Availability and Population Growth during 1950-2050. Figure 7, page 22.
[24]	IPCC, 2014. working group II on climate change and ocean acidification http://ocean-acidification.net/2014/04/07/ipcc-working-group-ii-on-climate-change-and-ocean-acidification/	- Acidification and eutrophication level in world ocean bodies.
[25]	Pakistan Highways Rehabilitation Project, 2010. Project ID, P010556. Report No, AB2170. National Highway Authority. Government of Pakistan.	- General information on road network, its functionality and key issues to it.
[26]	Awan, M. Y., & Kazmi, N. S. (2008). Present Condition and Causes of Decay of Tomb of Jahangir at Shahdara , Lahore, *Engineering. & Applied Sciences.* **2.** http://www.uet.edu.pk/export/sites/UETWebPortal/research/researchinfo/journal/volume2/7.pdf	- Decay of jahanger tomb due to air pollution and vibration of transport, topics 5.3 and 5.4, page 56.
[27]	Environment issues. (2012). Environmental Protection Department, Government of Punjab, Pakistan. http://epd.punjab.gov.pk/solid_waste	- Information on solid waste generation capacity and other major environmental problems in Pakistan.